REPORT OF THE

JOINT INDO-AMERICAN TEAM

ON

AGRICULTURAL RESEARCH

AND

EDUCATION

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THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH NEW DELHI
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AGRICULTURAL RESEARCH AND EDUCATION

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New Delhi
September 28, 1955

Dear Mr. Thapar,

It is a pleasure to present herewith the Report of the Joint Indo-American Team on Agricultural Research and Education in India.

The opportunity for selected officials of the Indian Central and State research and educational institutions to visit the United States, followed by a similar review of work in India by the American Team members, has provided a broad base of mutual understanding of the problems and potentialities for improvement in technical agricultural activities.

The report reviews briefly the activities of the present organisations conducting research and educational programmes in the country. The analysis of the current work, organisation, and policies relating to agricultural research and education has naturally disclosed a number of areas susceptible of improvement.

The recommendations included in the report have, with one exception, the unanimous support of the Indian and American members of the Joint Team. A special effort has been made to develop recommendations that are suitable for implementation within the present organisational structure and economy of the Centre and the States.

The response and progressive assistance from those contacted by the Joint Team in the review of Indian institutions has been of inestimable aid in the analysis of problems that require rectification. We hope the recommendations of the Team, when implemented, will aid in increasing the efficiency and effectiveness of the efforts of the many fine technical agricultural workers in India.

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Yours sincerely,

K.R. DAMLE
B.N. UPPAL A.H. MOSEMAN
L. SAHAI R.E. BUCHANAN
H.K. NANDI E.E. LEASURE
J.V.A. NEHEMIAH

To,

Shri P.N. THAPAR, I.C.S.,
Secretary,
Ministry of Food and Agriculture,
Government of India, New Delhi

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I. INTRODUCTION

THE future economic and social development of India is dependent to a large extent upon the technological improvement of agriculture in the country. Agriculture contributes nearly 50 per cent of India's national income and provides direct employment to 100 million persons.

2. Acute shortages of food grains required special attention during the First Five-Year Plan period, from 1951 through 1955. These shortages have largely been alleviated through the use of improved agricultural practices, irrigation, improved seeds, and a substantial increase in the use of fertilisers. The present diet in India, however, is still unbalanced, and is deficient also from a calorie standpoint. Consideration is now being given to increasing the present *per capita* consumption of food of 1,800 calories per day to 2,600 calories per day, to be achieved by 1971. It is considered desirable to increase the *per capita* domestic supply of cotton textiles and also to provide a substantial amount of woollen textiles.

3. The food, clothing and other products of agriculture needed by the people of India in the near future require a substantial increase in the agricultural production capacity of the country. It is estimated that if the numerous objectives for the Second Five-Year Plan are to be achieved, total production of food grains should be raised from 55 million tons of cereals and 10 million tons of pulses in 1955-56 to about 63.5 million tons of cereals and 11.5 million tons of pulses in 1960-61. The total production of sugar should be increased from 18 lakh tons to 22.5 lakh tons. The goal for increase of oilseeds is from 55 lakh tons to 70 lakh tons. The total production of cotton is to be increased from 42 lakh bales to 55 lakh bales and jute production from 40 lakh bales to 50 lakh bales in 1960-61. These are indicative of the substantial increases in production to be met by India's agriculture during the next five years.

4. It is recognised that the success in meeting the above and other similar production objectives will largely depend on expansion of irrigation, increased use of fertilisers and other improved production practices.

5. The current labour on the land is producing at about the maximum capacity that can be expected with current tools, power and present ability to meet production hazards of diseases, pests and unfavourable weather. Anyone who has seen the Indian farmer drive his bullocks to the field, carrying his *desi* plough on his shoulder, will agree that the cultivator and the other equally hard-working members of his family will do their part in meeting future agricultural needs, within the limits of the technology at their command. It is improved technology that is needed.

6. In recognition of the need for extending the current knowledge of improved cultural and production practices to the villager, as well as information on health, sanitation and other factors related to the welfare of rural people, the Government of India initiated the multi-purpose programme of Community Projects under the First Five-Year Plan.

This programme has been extended to about 20 per cent of India's 500,000 villages and will be expanded further in the years ahead.

7. The experience of the past few years in establishing the Community Projects programme has resulted in a still further appreciation of the urgent need to provide rural people with more adequate education and technical guidance, if the production goals are to be met concurrently with the improvement of levels of living among this large and important segment of the Indian population.

8. The broad-scale problem of developing and extending improved practical knowledge to Indian agricultural communities demands an effective and efficient programme of research and education, in addition to an improved extension system. An expanded and fully-manned system for extending knowledge is only as adequate as the amount and dependability of the information to be extended. It can otherwise be merely a costly, empty pipe-line that will be a disappointment to the Government that built it as well as to the people who paid for it.

9. In developing a programme for the review and strengthening of the agricultural research, education and extension programme of the country, the Government of India recognised the advantage of utilising the experience of the United States and other countries with similar agricultural problems to guide adjustments suited to Indian conditions.

A. *Agriculture in the United States and India*

10. There are many similarities in the agriculture of the United States and India. Both countries are large geographically, with diverse soils and climates. Agriculture in both countries is practised under arid or dry-land conditions, rain-fed cultivation, and under irrigation. Many crops are common to both countries and problems of their production and improvement are similar.

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11. Agricultural research and extension in both the countries are responsibilities shared by the Central Government and the States, with the States exercising considerable autonomy in the conduct of work in these fields. The task of organisation, support and co-ordination of these activities to insure maximum efficiency is a common problem in the United States and India. Each has something to contribute to and learn from the other.

B. *Origin of Joint Indo-American Team*

12. A project for assistance to agricultural research, education and extension organisation in India was developed under the Technical Co-operation Programme between the Government of India and the Government of the United States, as Operational Agreement No. 28, signed by the representatives of the two Governments on April 30, 1954.

13. This project provides for various types of co-operative assistance in the agricultural research and education fields. As one major phase of the project, a Joint Team, consisting of five representatives of the Indian Government and three American specialists in agricultural research and education, was selected to make a comparative study of the organisation, functions and operation of Indian and American agricultural research and

educational institutions, as a basis of developing recommendations for strengthening the programme of research and education in India (Appendices I and II).

C. *Review of U.S. Institutions by Indian Members*

14. The Indian representatives on the Joint Indo-American Team visited the United States in January, February and March, 1955, to study research and educational institutions and their activities. A number of leading Land-Grant Colleges were visited together with research institutions of the Central Government (Appendix III).

D. *Review of Indian Institutions by American Members*

15. In July, 1955, the three American members of the Joint Indo-American Team came out to India to review the agricultural research and educational programme and to develop, in co-operation with the Indian specialists, recommendations for adjustments and improvements in these activities. This review included discussions with the Government of India officials responsible for direction and administration of programmes in research, education and extension. Visits were made to research laboratories of the Centre, agricultural and veterinary colleges and institutions of the States and Universities. Discussions were held with the officials and Ministers of Agriculture in the States that were visited. Although it was not possible to visit all the important institutions in India, and similarly to study the programmes of these institutions in great detail, the scope and nature of contacts provided for a substantial cross-section analysis of the institutions that are predominantly responsible for research, education and extension activities in the country (Appendix IV).

16. The American members of the Team were greatly impressed by the progressive spirit that was almost universal among the Indian scientists and administrators who were contacted. There were a few instances where research units or administrative officials appeared to be unappreciative of the practical research or educational needs of the people on the land, but in the large majority of the cases there was a complete willingness to exchange views, to analyse objectively the present organisation and policy problems and to proffer constructive suggestions. This provides an exceptionally fine environment for the type of adjustments that should be considered and for the expansion of co-operative Centre-State efforts in the important research and educational fields.

E. *Scope of Report*

17. This report includes an analysis of current organisations, policies and activities, and embodies recommendations for improvement of (1) agricultural research, (2) education, (3) technical advisory services and (4) the relationships with other services and regulatory functions in agriculture. Consideration also has been given to the problems of (1) administration and personnel management and (2) professional societies and farm organisations, in so far as these are related to the effective development and implementation of continuing improvements in research, education and extension.

18. It is recognised that the recommendations of the Team are made for the consideration and adoption by the Government of India with such modifications as may be deemed necessary. In view of this, the Team has endeavoured to develop recommendations that should be susceptible of implementation under the conditions prevailing in India.

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II. RESEARCH

19. AGRICULTURE as practised in India is primarily based on an artisanship developed through generations of experience of those who tilled the soil. Today's cultivator has confidence in production methods that years of trial have evolved. His economic position precludes ready adoption or acceptance of new cultural practices, crop varieties or other improvements. New techniques must be as fool-proof and free from economic risk as possible before they are offered to the cultivator. Any neglect in this regard will result in loss of confidence of the cultivator not only in the organisation that did the research job to develop the new technique but also in the organisation that extended the new technique to him.

20. It is essential that the development of research and extension activities in agriculture be simultaneous and concurrently adequate. Neither can be productive or effective if the other is not equipped to carry its share of the mutual load.

21. The major part of the agricultural research to meet Indian problems must be done in India by Indian institutions. Some findings in foreign laboratories may be applied directly in India but most of such new discoveries will have to be tested and adapted to Indian conditions or practices.

22. There are many specific features or limitations in the agriculture of India that require domestic solution. The population pressure in some parts of the country—in some cases reaching a density of 0.4 acre *per capita*—requires heavy concentration on the production of food grains. Intensive cultural practices are necessary and double or triple cropping in a given year is practised in some areas to meet agricultural production needs.

23. The pattern of rainfall, with a major part of the precipitation coming during a limited period, presents critical problems not only in crop production but in land management and utilisation. Crop varieties must be developed with a capacity to produce maximum yields in short growing seasons of two to three months.

24. Substantial areas of India in the semi-arid regions should be developed for the production of improved livestock. India's dependence on the bullocks for draught power demands a livestock research and improvement programme suited to the country's requirements. Dual purpose animals for draught and milk production provide a real opportunity for maximum utilisation of limited feed resources. This opportunity cannot be realised without a greatly expanded livestock improvement research programme. The need for more milk products in the Indian diet is widely recognised, but it can be met only by development of better dairy animals bred to thrive and produce under various Indian environments.

25. The foregoing are only a few of the many problems that must be provided with solutions suited to Indian conditions. Indian research institutions must be developed and staffed to meet these needs.

A. *Central and State Responsibilities*

26. The agricultural problems awaiting investigation in India are of such scope and magnitude that they must receive abundant support and attention at both the Centre and State levels. The impact of adequate food, clothing and shelter on the economic, social and political status of its people is of such significance that the Central government must be concerned with provision of these essentials. They are problems of all the people.

27. The Constitution of India provides for certain functions to be handled by the Union Government exclusively, others to be handled by the States exclusively, and certain other functions to be handled either by the Union or the States. The Seventh Schedule of the Constitution provides for the following division of responsibility for research:

List I—Union List

No. 65. Union agencies and institutions for—
(*b*) the promotion of special studies or research.

No. 66. Co-ordination and determination of standards in institutions for higher education or research and scientific and technical institutions.

List II—State List

No. 14. Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases.

No. 15. Preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice.

28. It is evident from the above provision in the Constitution that both the Centre and the States must assume a share of the responsibility for insuring progress in agricultural research.

B. *Current Support and Administrative Procedures*

29. In the review of the existing programmes of research it is desirable to analyse the different major organisational units in terms of their activities and administrative procedures. Such analysis of the existing programmes and organisational units, including current deficiencies, provides a background of understanding regarding the recommendations for improved organisation which will follow.

1. *Ministry of Food and Agriculture*

30. The support for research by the Government of India, Ministry of Food and Agriculture, is provided through the several Central Research Institutes, Boards or Directorates, as follows:

1. Indian Agricultural Research Institute, New Delhi
2. Indian Veterinary Research Institute, Izatnagar
3. Directorate of Plant Protection and Quarantine, New Delhi
4. Directorate of Agricultural Marketing and Inspection, New Delhi

5. Central Rice Research Institute, Cuttack
6. Central Potato Research Institute, Patna
7. Sugarcane Breeding Institute, Coimbatore
8. Sugarcane Research Institute, Bhadruk, Lucknow
9. Vegetable Breeding Station, Kulu
10. Indian Dairy Research Institute, Bangalore
11. National Dairy Research Institute, Karnal (proposed)
12. Central Soil Conservation Board
13. Forest Research Institute, Dehra Dun
14. Central Inland Fisheries Research Station, Barrackpore
15. Central Marine Fisheries Research Station, Mandapam
16. Deep Sea Fishing Station, Bombay

31. These organisations were established to provide for basic research, guidance and experience in the solution of practical agricultural problems, particularly of regional or national significance.

32. The Indian Agricultural Research Institute (I.A.R.I.), established as the Imperial Agricultural Research Institute in 1905 at Pusa in Bihar, and transferred to New Delhi in 1936 following the destruction of the original station by the earthquake of 1934, is the premier agricultural research institute, covering a wide range of subjects. In addition to research on basic problems relating to the various disciplines of the agricultural science, the Institute conducts post-graduate training, and survey of advisory work in a number of fields.

33. The Indian Veterinary Research Institute (I.V.R.I.), with its main station now located at Izatnagar (Bareilly), was first established as the Imperial Bacteriological Laboratory at Poona in 1889. It was transferred to Mukteswar in 1893. In 1915 a station was established at Izatnagar, which was developed as the main centre, with the Mukteswar facilities retained as a sub-station.

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34. In addition to research, the Indian Veterinary Research Institute has facilities for in-service training and provides for post-graduate work whereby students may be presented for M.Sc., Ph.D., or D.Sc. degrees from affiliated Universities.

35. The Institute provides certain additional services including production of antisera and vaccines, increase and distribution of improved poultry, and diagnostic services for animal diseases on a nation-wide basis.

36. The I.A.R.I. and I.V.R.I., while conducting a substantial amount of very fine research work, are not in a position to function effectively as either leaders in agricultural, veterinary and animal husbandry research in India, or in a co-ordinating capacity for cooperative State-Centre programmes of a regional or national nature. The I.A.R.I. has no recognised position of leadership or responsibility in relation to the other Central Agricultural Institutes, which are restricted in their scope of research to particular commodity problems. These Central Institutes are individually responsible to different sections or administrative heads in the Ministry of Food and Agriculture. Thus, not even the research supported directly by the Ministry is subject to adequate internal co-ordination.

37. The I.A.R.I., I.V.R.I., and other Central Institutes similarly are not subject to effective co-ordination by the Indian Council of Agricultural Research, except to the extent that I.C.A.R. funds are provided for specific schemes. As a result, there is no effective mechanism for the co-ordination between the Central Institutes or for co-ordination of the work of these Institutes with the activities of the States, I.C.A.R. supported schemes, or schemes supported by the different Commodity Committees.

38. The above comments are not intended to minimise the importance of the I.A.R.I., I.V.R.I., or other Central Research Institutes. The provision of well supported and adequately staffed Central research institutes, to undertake fundamental research in the many sciences concerned with the improvement of agricultural practice, is basically sound. Such Institutes permit of the most efficient provision and utilisation of highly specialised equipment that would be too costly to duplicate at numerous locations. They provide an opportunity to concentrate at a single location highly competent scientists in many fields, so that there can be a maximum interchange of scientific knowledge where such interrelated knowledge is essential to the solution of difficult problems.

39. The I.A.R.I. and I.V.R.I. should be regarded as the principal functioning research organisations of the Government of India, in their respective broad fields, and should play a more effective role in the co-ordination of schemes of regional or national importance. If these Institutes and the other Central Research Institutes are to function effectively for their intended purpose in providing a substantial nucleus of background information for the guidance of research on the many important practical problems, they must be adequately supported and staffed with scientists of sufficient stature not only to conduct research of a high order in the respective fields, but also to maintain the confidence of the related research workers in the various States.

40. It is essential also that the Central Institutes dealing with specific commodity or problem fields be located with headquarters, wherever possible, in the region in which the practical problems exist. This will insure maximum effectiveness of the institute in providing the co-ordinating and guiding leadership which should be its principal function and responsibility.

2. *Indian Council of Agricultural Research*

41. Following the constitutional changes in 1919 which resulted in the transfer of agriculture as a provincial subject, it was soon recognised that some agency was needed to co-ordinate research between the Centre and the Provinces. The Royal Commission on Agriculture, in 1928, after studying this problem, recommended the establishment of a Council of Agricultural Research. The Imperial (now Indian) Council of Agricultural Research was brought into being in 1929. Development and extension work also was brought within the scope of the Council's activities at subsequent dates.

42. The responsibility for the training of extension personnel was transferred from I.C.A.R. in 1955 when the Extension Wing of the Council was reconstituted into a separate Extension and Training Directorate in the Ministry of Food and Agriculture.

43. The aims and objectives of the Indian Council of Agricultural Research are:-

(*i*) to undertake, aid, promote and co-ordinate agricultural and animal husbandry education and research ;

(*ii*) to act as a clearing house of information not only in regard to research, but also to agricultural and veterinary matters generally ;

(*iii*) to establish and maintain a research and reference library in pursuance of the objects of the Council with reading and writing rooms and to furnish the same with books, reviews, magazines, newspapers and other publications ; and

(*iv*) to do all other things which the Council may consider necessary, incidental or conducive to the attainment of its objects

The constitution of the Council provides that the Minister for Food and Agriculture, Government of India, shall be its President. A Vice-President is provided as the chief executive officer, who also acts as Agricultural Adviser to the Central Government.

44. The Council has no research institutes under its immediate supervision, but finances research work carried out in Government Institutes of the Centre and the States, in Universities, and also in recognised private institutions. The Council now finances a large number of research projects in agriculture and animal husbandry, with a total expenditure to date in excess of 338 lakhs of rupees.

45. The activities of the Council are not limited to research, but also include education and development. The Council undertakes training of students in agricultural and animal husbandry statistics and has helped to build up a school of research in this field. In addition, it has set up the Indian Council of Agricultural Education.

46. The I.C.A.R. publishes a number of journals, monographs,bulletins, pamphlets and reports ranging from technical communications for research workers to popular pamphlets for the benefit of the layman. The Council also provides various types of audio-visual aids in disseminating useful information.

47. The Indian Council of Agricultural Research has contributed significantly to the support and integration of research in India. An examination of the activities and responsibilities of the Council, however, discloses a number of fundamental deficiencies that call for rectification. Although several changes have been made in the functions and responsibilities of the Council since its establishment in 1929, the present organisation and staffing pattern are inadequate to meet the multitudinous needs for the support and co-ordination of research, together with the additional responsibilities for education and development now envisaged in its province.

48. The Royal Commission on Agriculture which recommended 25 years ago that the Vice-President of the I.C.A.R. in his capacity as the chief excecutive officer should act also as the Agricultural Adviser to the Government of India undoubtedly could not have envisaged the expanded scope and specialised nature of the advice demanded of him under the present day conditions. The increasing application of technology to agriculture in India will require highly specialised attention to the specific major problem fields. This

precludes the effective functioning of a single individual as a sound adviser on the many highly specialised subjects. Consideration should, therefore, be given to the development in the I.C.A.R of a well rounded staff of specialists in the major problem fields to serve as a senior council of special consultants or advisers under the Vice-President.

49. As the pioneer organisation in the field of research co-ordination, the I.C.A.R. had to evolve its own procedures for supporting research programmes. In the earlier stages the Council exclusively depended on the State Governments to submit research schemes for consideration and sanction. Such a procedure, under which each State considers research programmes within the framework of its own interests, results in piecemeal approach to broad problems of regional and national importance, which call for an integrated approach and the harnessing of the resources and facilities available in the concerned States and the Centre for the common good.

50. In recent years, the Council has recognised the importance of a regional approach to research problems and has been financing a number of ' co-ordinated schemes ' which embrace a region or a group of States that co-operate on the mutual problem, with the results of the research made available to the whole region. The importance of such a regional approach to problems concerning more than one State, or problems of a national character, by a Central co-ordinating agency like the I.C.A.R. cannot be over-emphasised.

51. All the schemes sanctioned by the I.C.A.R., both of a short-term and long-term nature, are approved initially for a period not exceeding five years. After periodical reviews such schemes as are promising are invariably extended until the original objectives have been fulfilled. While this procedure may be administratively convenient and enables the Council to have periodical reviews before the life of a scheme is extended, it presents certain staff problems which militate against the research staff engaged in such schemes giving their best efforts. The temporary nature of the Council's schemes, although they are extended from time to time without break, precludes the employment of permanent staff, except a few who may be seconded by the State Government to such schemes. Such temporary staff can hardly be expected to give their undivided attention to research work with an uncertain future hanging like a sword of Democles over them. In many cases, competent research workers leave the schemes because of insecurity and seek their prospects elsewhere, resulting in the break of much desired continuity in research work and the dissipation of trained research workers, often into fields not even remotely connected with their training and experience. This is one of the reasons why a hard core of trained research workers in different scientific fields has not been built up through I.C.A.R. research schemes although the Council has been sponsoring research for the past 25 years.

52. The Council has not been able to take effective leadership in co-ordinating research in agriculture and animal husbandry undertaken in the country as a whole. This is due primarily to the fact that its powers of co-ordination are limited to the schemes or projects sponsored by it. Even here, the co-ordination consists primarily of reviews of reports, a paper review without actual field inspection of the work under way. The Council is not currently recognised as an agency responsible for the co-ordination of the work conducted by the various Central Institutes or for the co-ordination of local research conducted by the States. Some provision had been made for co-ordination of the research supported by the

Commodity Committees, through the action of the Vice-President of the Council who was till recently the Chairman of all the eight Commodity Committees. While this procedure appears to the Team to be cumbersome, time-consuming and of questionable effectiveness, even this liaison appears to have been broken as the Vice-President is no longer the Chairman of all the Commodity Committees. In view of the above short-comings, a considerable revision in the organisation and functional responsibilities of the Council is desirable.

3. *Central Commodity Committees*

53. A substantial part of the support for research on a number of the major crop commodities in India is provided by the Central Commodity Committees. Some of these Committees were established by Statute and are empowered to utilise the revenues from a special cess on the respective products, on the basis of processed units. The Indian Central Oilseeds Committee, for example, derives its revenues from an excise duty at the rate of one anna per maund of all oils extracted from oilseeds crushed in commercial processing plants.

54. The Indian Central Commodity Committees have been established for the following crops:

(1) Cotton
(2) Sugarcane
(3) Tobacco
(4) Oilseeds
(5) Jute
(6) Coconut
(7) Lac,
(8) Arecanuts

The support for some of these Commodity Committees (e.g. Jute, Sugarcane, Arecanut and Tobacco Committees) is not provided through a special cess, but by direct allocations from the Ministry of Food and Agriculture.

55. The Commodity Committees were established in recognition of the need for special attention to the problems confronting the cotton, sugarcane and other important industries. It is generally recognised that the Central Commodity Committees have made significant contributions to the technological advancement in their respective fields of work. There is a wide difference of opinion, however, regarding the organisation, functions, and future responsibilities of these committees.

56. The large membership of these Committees, for example, 65 members of the Indian Central Oilseeds Committee and 52 members of the Indian Central Cotton Committee involves a heavy overhead cost in terms of salaries of permanent staff and for travel of those attending the Committee meetings. The time required by administrators and scientific personnel of the Centre and the States for the work of the several Committee meetings, one or two times during the year, is a significant item. The direct administrative costs for the Committees range upwards from 10 per cent, not including the time, salaries and travel of the individuals from the States or organisations outside of the Commodity Committee membership.

57. A second deficiency of the Central Commodity Committees is the short-term sanction of support for many of the schemes which results in the same difficulty in adequate planning and in the employment of permanent personnel as in the case of I.C.A.R. grants discussed previously.

58. An undesirable feature of the requirement that funds provided by the Committee be matched is that some States have not been in a financial position to provide the State funds for matching. This has resulted in the accumulation of substantial unutilised funds by some Committees. The Indian Central Oilseeds Committee, for example, has accumulated a reserve fund of rupees 70 lakhs since it was established in 1947. The average income of this Committee from the cess on oilseeds amounts to rupees 15 lakhs annually. The funds intended for support on research on oilseeds are, therefore, not achieving the results which are urgently needed for the many problems of the large number of oilseed crops.

59. A major detrimental effect of the Commodity Committee approach to agricultural problems is the neglect of the many important problems that transcend commodity fields. Inadequate attention has been given to soil improvement and management, agricultural engineering, farm management and economics, improved utilisation of agricultural resources, home science, and similar non-commodity problem areas.

60. The Commodity Committees should not be abolished but a substantial revision in the make-up and functions of the Committees, to reduce overhead costs and to provide for use of a portion of their funds to support crop rotation, soil management, and similar cross-commodity research projects, would permit of the development of a better balanced programme of agricultural research in India. This could be achieved by the Commodity Committees contributing a percentage of their annual income to a fund to be administered by I.C.A.R. for supporting research of the type mentioned.

4. *State Departments of Agriculture and Animal Husbandry*

61. The Departments of Agriculture and Animal Husbandry are the principal agencies responsible for the technical aspects of agriculture at the State level. These departments direct the activities in (1) research, (2) education, (3) extension and (4) numerous service or regulatory functions that vary from State to State.

62. Some of the colleges of agriculture and colleges of veterinary science and animal husbandry visited by the Team have well-rounded research programmes. The work is extremely good in certain fields, but in most instances it is extremely deficient in other important fields. The reasons for lack of effectiveness vary in the different States.

63. In some of the States, colleges of agriculture and colleges of veterinary science and animal husbandry are just now being established. They have not had an apportunity to develop in a manner that would permit of their fully effective functioning because they are in temporary quarters and sometimes in locations that preclude necessary field studies.

64. The staff available for conducting research in important problem fields is woefully inadequate in most of the State colleges or research institutions that were visited. The research on the control of plant diseases in most of the institutions visited is in the hands of a

single senior mycologist or plant pathologist, with only a limited number of junior professional assistants available to conduct research on all of the important crop disease problems in the State. The attention given to the important problem of insect vectors of plant diseases in India, for example, is limited to two full-time employees, with spasmodic, part-time attention by other scientists. The tremendous loss in India from plant diseases will not be reduced or overcome if the information to guide the suppression or control of such diseases must come from the limited number of scientists now working on these problems.

65. Similar inadequate attention is being given to important research fields related to animal production and improvement. There is an excellent opportunity to increase milk production in India through the breeding of productive dairy animals. This work is now carried on at only a few institutions and the staff available is not adequate to conduct intensive genetic and breeding research on a scale required to make effective progress. The development of improved animals lacks the well-integrated approach that should include the participation of a number of well-equipped and staffed co-operating research organisations.

66. The field of animal nutrition had been largely neglected. Additional research should be undertaken to develop resources of fodder and concentrate feeds to provide better nutrition which is essential to improved growth, sexual maturity, and breeding ability of cattle.

67. Livestock farms have been established in various places by the Central and State Governments largely for the improvement of certain breeds by selective breeding. These farms have not given adequate attention to nutrition and disease problems.

68. The deficiencies in the above fields and other fields of work are primarily due to (1) the limited staff of research workers employed in these fields, (2) lack of stability of funds for research, and (3) ineffective organisation and procedures for co-ordinating efforts on mutual problems of regional or national significance. There are available and working in India a number of highly competent, well-trained individuals in the above and similar fields that need expansion, to provide the nucleus of guiding leadership for more adequate research on these problems.

69. The limited number of research workers in most of the State research institutions has been handicapped in many cases through the necessity of assuming related but non-research responsibilities. The plant pathologists devote considerable time to the service of indentifying plant diseases in specimens forwarded by extension workers and other individulas. They are expected to serve as consultants in transmitting current information to the Extension or Community Project Administration staff and the public. These are functions for which the research sections and staff members should assume some responsibility, but at the present time this additional work-load on an already limited staff of research workers is rendering the research ineffective in many fields.

70. The research activities, as well as the related educational or training functions of a number of colleges of agriculture and veterinary science or animal husbandry, are becoming increasingly handicapped because of the location of these institutions in crowded urban areas. The gradual encroachment of urban development has reduced the available

land area so that space for field experiments and for proper care of animals is inadequate. These institutions face a further difficulty in attempting to do research on rural problems and provide teaching in agricultural fields under an urban environment.

71. A further distinct disadvantage in the present location of the institutions responsible for research in agriculture and in veterinary science and animal husbandry is the separation of such institutions. The problems of the cultivator do not fall into sharply defined categories of crop production on the one hand and animal health and production on the other. He must have healthy bullocks to furnish power for his farm operations. The health and vigour of his bullocks depend not only upon the control of diseases and the treatment of injuries, which fall in the field of veterinary science, but also upon the proper feeding and nutrition which entail not only animal nutrition studies but attention to the production of adequate feeds. The latter problem also must be considered by the agricultural research staff that is responsible not only for the development of suitable varieties of feed and fodder crops but also the development of crop rotations that will provide for sufficient diversity to include feed production in the cropping scheme.

72. The breeding and improvement of better cattle requires the special attention of scientists well-trained in animal breeding and genetics, who understand the impact of nutrition on breeding behaviour and animal development, and who can devote full attention to this important problem. This work is neither the responsibility of the agronomist nor the veterinarian, but under the present strong tendency for independence and separation of the colleges of agriculture and veterinary science, this important work has become a step-child, to the great detriment of India's agriculture. There are several States that are in the process of re-locating their colleges of agriculture and veterinary science and every effort should be made to establish these institutions at the same location so that the needs of farmers can be met in a well-integrated manner.

73. In some of the colleges of agriculture, and of veterinary science and animal husbandry, the research and teaching functions are not co-ordinated. The research staff in these institutions, although working in laboratories and on lands that are a part of the college campus, report directly to the Director of Agriculture or Veterinary Science and have no recognised responsibility to the Principal of the College. This arrangement does not permit of the interchange of competence of research and teaching staff. It is highly desirable for the teaching staff in a college to conduct some research. This provides a stimulus to keep up-to-date and to seek new knowledge as well as to transmit it. Similarly, the research staff should be utilised in presenting a number of lectures to the college classes during the course of the year so that the latest discoveries in their respective fields can be imparted to the students who must have such up-to-date imformation if they are to serve effectively in professional agricultural fields, or if they return to the land. The effective integration of research and teaching is particularly essential in those institutions expecting to provide post-graduate training.

74. The colleges of agriculture and the colleges of veterinary science and animal husbandry, with their research centres, should serve as the principal co-ordinating organisations for research at the State level. The Principal of the Government run college preferably should be a Joint Director of Agriculture, with assigned responsibility for the fields

of research and education at the State level. He should be a well-qualified technical man with a sound background of research.

5. *Other Institutions*

75. There are a number of research institutions that are not associated with the Ministry of Food and Agriculture, with the States, or with the normal agricultural pursuits, that contribute directly to advances in agricultural technology. Some of these institutions visited by the Team in India include:

(a) The National Physical Laboratory, New Delhi,
(b) The National Chemical Laboratory, Poona,
(c) The Central Laboratory for Scientific and Industrial Research, Hyderabad,
(d) The Indian Institute of Science, Bangalore,
(e) The School of Tropical Medicine, Calcutta, and
(f) The All-India Institute of Hygiene and Public Health, Calcutta.

The Indian Council of Agricultural Research has recognised the value of these institutions for conducting research in specialised fields related to agriculture and has provided most of them with funds for the support of special research projects.

76. The National Physical Laboratory at New Delhi, located in the immediate area of the Indian Agricultural Research Institute, provides a particularly good opportunity for co-operative research that requires highly specialised equipment and facilities for physical science studies related to agriculture. Greater advantage should be taken of this opportunity to develop joint research programmes between the National Physical Laboratory and the Indian Agricultural Research Institute to minimise requirements for costly specialised equipment for the Indian Agricultural Research Institute.

77. Similar close working relationships should be developed at Poona between the National Chemical Laboratory and the College of Agriculture. The facilities and equipment at the National Chemical Laboratory did not appear to be utilised to the maximum capacity and it should be possible to expand co-operative research relating to quality evaluation of agricultural products and other basic chemical problems in agriculture.

78. The Central Laboratory for Scientific and Industrial Research at Hyderabad has under way a number of important lines of research relating to the utilisation of agricultural products. This field of research should be expanded greatly, both from the standpoint of developing new industrial products from agricultural commodities and for the development of new sources of feeds from otherwise waste agricultural material.

79. The Indian Institute of Science at Bangalore is conducting some excellent fundamental research on problems directly related to agriculture. The support of research at this Institute by the Indian Council of Agricultural Research appears to be exceptionally sound and this institution can contribute significantly to fundamental advances in the agricultural science.

80. There are several other laboratories responsible to the Council of Scientific and Industrial Research that were not visited by the Team but which conduct research of direct

concern to agriculture. The Central Food Technological Research Institute, Mysore, is carrying on studies in food processing. The Central Drug Research Institute at Lucknow and the Central Leather Research Institute at Madras also contribute substantially to the research of interest to agriculture.

C. *Summary of Current Status of Research*

81. The agricultural research under way in India includes some excellent work in well-equipped laboratories with trained and able scientists making a real contribution. The total research programme under way, however, is inadequate to meet the needs and demands for improved agricultural materials and practices on Indian farms.

82. The enlarged programme of the National Extension Service and the Community Projects Administration, to improve the level of living of the village people, has been received enthusiastically. Agricultural research laboratories will have increasing demands for information as the village people realise the benefits from new knowledge and begin to request for still further improvements. Although the present development of the expanded extension programme has not yet reached the half way point, there is evidence that the present agricultural research output is not up to the task of meeting the needs for new information.

83. The Government of India and the co-operating States cannot afford to permit inadequate or unfounded information to pass through the expanded channels for agricultural extension, including the multi-purpose village development programme. It would be unfortunate to shake the confidence of the villagers in the reliability of the information presented to them.

1. *Inadequate Coverage and Financial Support*

84. The present deficiency is primarily due to the lack of adequate staff for conducting research in the many problem fields. A number of important problems, including soil improvement and management, agricultural engineering, farm management and economics, the utilisation of agricultural products, and home science, are receiving research support far below the level required to make effective progress in developing improvements in these fields.

85. There is need for a substantial expansion of research coverage which will require additional facilities and trained scientific staff, not only for new fields of work but also to strengthen existing but inadequate research programmes.

2. *Temporary Nature of Current Research*

86. Research to be effective and efficient must be planned in a way that will permit of a balanced approach to the various elements in broad problem fields. A large part of the research in agriculture must be of a long-term, continuing nature. Crop varieties must be evaluated over several seasons to determine environmental influences and the impact of disease, insect, or other hazards. Animal improvement research is a slow process, depending upon the growth to maturity of the succeeding generations in a breeding population. This and similar research in agriculture cannot be hurried.

87. Although the I.C.A.R. in recent years has provided for grants of longer terms for many such projects, the large number of schemes that are sanctioned for only short

periods have been a handicap in the planning of research and particularly in employment of competent staff.

3. *Lack of Co-ordination*

88. Aside from a limited measure of co-ordination of schemes supported by I.C.A.R., there is no real integration of the agricultural research efforts conducted by the Centre, the States and other institutions in India. The work of the Central Institutes within the Ministry of Food and Agriculture is entirely independent of other Central institutes, of I.C.A.R. and the States. The rather independent action of the Commodity Committees in the development of research programmes presents a further problem in co-ordinating research resources to achieve the greatest return for the funds available.

89. The I.C.A.R. should be suitably strengthened to function as an organisation at the Centre with responsibilities for co-ordinating leadership and services that are recognised by the Central institutions, by the States and by other research organisations.

D. *Recommendations for Improvement of Agricultural Research*

90. The following measures are recommended for the improvement of the support and organisation for agricultural research in India:

1. *Financial Support*

91. The research programmes must be expanded substantially to meet the widespread needs for improvements in agriculture. Provision should be made for strengthening research under way and for the initiation of research in many potentially productive problem fields which today are essentially neglected.

a. *Central Funds*

92. One of the objects of the Indian Council of Agricultural Research is 'to *undertake*, aid, promote and co-ordinate agricultural and animal husbandry research.' Under this provision it should be possible for I.C.A.R. to employ personnel on a permanent basis, to be engaged in research projects financed by the Centre or co-operating States, and to furnish such supporting or operating funds as are necessary to carry out a research project. The I.C.A.R. funds would thus be used for essentially the same purpose as the current support of research of regional and national importance, but in a manner that would provide for the broad planning, continuity and stability that is urgently needed.

93. The funds of the I.C.A.R. should be utilised to initiate work in fields that are not receiving attention or to strengthen research in fields where current research is inadequate.

94. The funds of the I.C.A.R. should also be app'ied to the employment of scientific staff to serve as Project Co-ordinators in conducting field reviews of co-operative schemes or projects involving the participation of a number of States in research of regional significance. Such Project Co-ordinators should be mutually responsible to the Centre and to the States for developing procedures for maximum exchange of information and materials in co-ordinated research schemes. They should not be "desk officers" but active research workers located at the Central or State research stations in charge of studies that are a constituent part of the project they serve as co-ordinators.

95. A percentage of the annual income of the Commodity Committees should be

credited to a fund controlled and administered by the I.C.A.R., for supporting crop rotation, soil management and similar cross-commodity projects which would permit of the development of a better balanced programme of agricultural research in the country as a whole.

96. In sanctioning regional and all-India research schemes, the I.C.A.R. and the Central Commodity Committees should, instead of making cash contributions, revise their policy and supply both trained personnel and money to work in co-operation with staff supplied by the States and co-ordinated by the Project Co-ordinator.

97. The I.C.A.R. should, under the new dispensation recommended, maintain a central cadre of scientific personnel of the rank of Class II service and above and utilise them in the regional schemes. Provision should also be made to lend such staff to the Central Commodity Committees who should not be permitted to make open recruitment of research staff for their schemes, without satisfying themselves that such staff could not be obtained through the cadre of scientific staff maintained by the I.C.A.R. for supporting research schemes.

98. It is recommended that the scientific staff in the cadres mentioned, who render approved service, should be made permanent in the cadre and assured avenues of promotion in the different research schemes sponsored by the I.C.A.R. and the Commodity Committees. This would ensure that promising research workers are given stable employment and permitted to work in their respective fields over a long period although they may have to be shifted from one research scheme to another.

99. The extent to which the functions of the Central Commodity Committees for planning and implementation of research are to be integrated into the I.C.A.R. will depend upon the interest of the Government of India in achieving co-ordinated, efficient use of the available research funds and resources. If maximum return is desired from such research resources, a maximum integration of the Commodity Committees into the I.C.A.R. is essential.

100. The administration of the Commodity Committees which is now done partly by the Ministry of Food and Agriculture and partly by the Vice-President, Indian Council of Agricultural Research, should be placed under the I.C.A.R. While the Commodity Committees would function independently in their respective fields, a portion of their annual income would be made available to the Indian Council of Agricultural Research to take care of gaps in agricultural research sponsored by the Commodity Committees and the Indian Council of Agricultural Research. For proper co-ordination of the work done by the Commodity Committees and the Indian Council of Agricultural Research, the Vice-President of the I.C.A.R. should be the Chairman of all the Commodity Committees.

101. The foregoing adjustment should achieve a much more efficient and productive use of research funds currently available. There is need, however, for a substantial increase in research support.

b. *Central Grants to States*

102. In order to provide for a more adequate level of research for the country, it is recommended that the Centre should appropriate an additional two crores of rupees each year, to increase the total research funds by an amount of 10 crores at the end of five years.

This gradual increase would permit of an orderly expansion and efficient utilisation of increased funds.

103. These new additional funds should be allotted directly to the States as long-term, continuing grants, distributed on the basis of proportion of population (Appendix V)

104. The funds granted directly to the States should be available for use on any significant problems requiring research attention in the field of agriculture of the State, as determined by the individuals in the State responsible for research and related technical programmes. The administration of these funds by the Centre should be limited to (1) the maintenance of a record of projects to which these funds are assigned by the States, (2) a brief report to be submitted by the States annually, summarising the use of the funds and progress of the research, and (3) an annual field review by selected staff members of the I.C.A.R. to observe the work in the field and discuss the progress of research with the appropriate State officials.

105. In addition to the above provision for continuous grants from the Centre to raise the threshold of support for agricultural research in India, attention should be given to building up the research facilities and programmes in the currently less well-developed States. Some States, such as the Punjab and West Bengal, have been forced to develop new agricultural colleges and research facilities. The Part 'C' and other less developed States also are in urgent need of agricultural research facilities to enable these States to meet the many needs of their rural people. Provision should be made in the Second Five-Year Plan for improving the research capacity of such States through Central grants to cover 75 per cent of the capital expense and loans for the remaining 25 per cent, with full provision by the Centre for recurring operating expenses for the five-year period. This should be in addition to the long-term central grants-in-aid. Such new facilities are in order to activate important research work as soon as possible in these under-developed States.

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c. *State Funds*

106. The provision of the added funds by the Centre does not obviate the need for continuing support for agricultural research by the States. One means of insuring continued support by the States would be through a matching-fund requirement. This involves added administrative costs, restricts freedom in the development of reasearch plans by the States, and should be avoided except as a last resort in bringing laggard States into line. Provision could be made for I.C.A.R. to review continuity of State funds and for the Centre to with hold the additional grants from States that decreased State support for agricultural research.

107. It is expected that the States would provide such additional support as may be desirable to meet significant problems of local or State-wide importance. The States also should give attention to the development of adequate research facilities to permit of their participation in research of regional or national significance, wherein personnel employed by the I.C.A.R. could be located in the problem areas where research is to be conducted.

108. It will be necessary for the Centre and the States co-operatively to review and evaluate the projects currently supported from the I.C.A.R. and the Central Commodity Committee funds to determine which schemes should be continued through I.C.A.R. direct

support, which should be taken over by the States either through utilisation of State funds or the new central grant funds, and which schemes should be discontinued. This review should be made by the Advisory Board of I.C.A.R. to insure joint Centre and State participation in the development of recommendations to the Governing Body of I.C.A.R.

d. *Future Support*

109. At the end of five years, when the full increments of grant funds to the States have been provided, careful consideration should be given to the need for future research support. This evaluation also should be made by the Advisory Board with recommendations to the Governing Body of I.C.A.R. relative to further Central support, and by the respective State representatives to their appropriate officials relative to further State support.

110. The foregoing provisions would achieve a co-ordinated and efficient use of available research resources and would provide the States with new additional funds in a manner that would permit of effective planning and stability of research personnel at the State level.

2. *Organisation at the Central level*

111. It is essential that there should be an organisation at the Centre that can effectively serve as the technical arm of the Ministry of Food and Agriculture. This organisation should provide for consultation and advisory service on all technical questions relating to the planning and evaluation of agricultural programmes. It should include a competent staff for analysing specific agricultural programmes for guidance of the Planning Commission, Members of Parliament and other Government officials. It should co-ordinate all research and related technical activities supported by the Centre, as well as regional and national programmes in which the Centre participates with the States or other agencies.

112. This organisation should provide for a complete record of all agricultural research schemes under way in India, as a service not only to officials at the Centre, but also for the States and other organisations interested in knowing the extent and location of research under way, as a basis for planning new or expanded programmes.

a. *Indian Council of Agricultural Research*

113. It is believed that these responsibilities can be encompassed within the existing charter of I.C.A.R., with slight modifications in functions and a substantial alteration in organisation and staffing.

114. In the discussions that follow relative to the I.C.A.R., the terms ' agriculture' and 'agricultural' are used in the comprehensive sense of covering crops, soils, agricultural engineering, veterinary medicine, animal husbandry, farm management and economics, home science and all other similar fields or disciplines involved in or related to farm operations and the agricultural industry.

115. Under the present constitution of the I.C.A.R., the Minister of Food and Agriculture, Government of India, is its President. This provision, as well as the provision for the Governing Body, the Advisory Board, the Standing Committee and the Standing Finance Committee, together with their functions, should be retained. The membership of the Advisory Board may require review to insure adequate representation of all States and major research organisations, e.g. National Laboratories concerned with agriculture.

b. *Executive President of the Council*

116. A Vice-President is provided as the chief executive officer of the Council and Agricultural Adviser to the Central Government. It is recommended that the Vice-President or the chief executive officer should continue to have the position of Additional Secretary in the Ministry of Food and Agriculture. This title would serve to indicate the level of importance of this post in the Ministry and the status and position the head of such an important organisation should have *vis-a-vis* other heads of departments, both under the Centre and the States.

117. It appears that by convention, this post has been reserved for a member of the Civil Services, although on more than one occasion, the post had been held with distinction by agricultural scientists. Whatever may be the reasons for this arrangement, the Vice-President or the chief executive officer can perform his function effectively as Agricultural Adviser to the Government of India, only if he has the desired scientific background and experience in the planning, supervision and conduct of agricultural research in India. In addition, to be the head of such an important organisation, he should have the required administrative grounding to do justice to his function as the chief executive officer. Consequently, the Team would be reluctant to acquiesce in the position that the field of selection should be limited to a particular Service. It may be that on occasions, members of the Civil Service with necessary scientific background and agricultural experience may be available to fill the post. Or, it may be that scientists of distinction with the necessary administrative ability could be selected. It will be inappropriate, therefore, in our opinion, to have a hard and fast rule limiting the choice invariably to one particular Service. We would recommend that on each occasion, the case should be considered on its merits and selection made from scientific personnel and members of the Civil Services, having regard to the considerations we have urged and the high status and requirements of the post.

118. The title of the chief executive officer should be changed from Vice-President to Executive President of the Council with the Minister of Food and Agriculture as the President. In most organisations the position of 'Vice-President' is not regarded as carrying real responsibility or leadership and the executive head of the Indian Council of Agricultural Research should not operate under this deficiency or handicap.

c. *Deputy Executive President of the Council*

119. The Executive President of the I.C.A.R. should be assisted on the technical side by a senior technical officer designated as Deputy Executive President. The Deputy Executive President should have maximum delegated responsiblility for decisions relating to the overall planning of regional or national programmes and for relations with the States and other organisations co-operating in research in which the Centre is concerned. He also should have broad responsibilities in providing leadership and guidance in the Council's activities relating to education and advisory services. The individual selected for this post must have the combined high technical or scientific stature and personal qualities that will insure maximum scientific leadership in an atmosphere of full co-operation with the Centre and State associates. In the absence of the Executive President of the Council, he would serve in handling the technical questions and problems of that office. He would be responsible also for developing and maintaining abalanced approach to the research, educational, information and other scientific functions of the Council. He should

be of a higher rank and grade than the Commissioners on the technical side who will retain their present status and grade sanctioned for Commissioners.

d. *Senior Secretary*

120. On the administration, financial and business management side, the Executive President should be assisted by a Senior Secretary who should be an experienced officer in administration having not less than four years service as a Deputy Secretary to the Government of India. He should be in the higher scale in the grade of Deputy Secretary to the Government of India to enable him to operate at a sufficiently high level to expedite handling of the important administrative matters of the Council. He would have full delegated responsibility for the handling and execution of most administrative affairs of the Council. This would enable the Executive President of the Council to devote major time to technical questions and decisions. In addition to the Senior Secretary, there should be a Secretary of Deputy Secretary status with such other administrative staff as is required for expeditious handling of the numerous administrative and business affairs of his office. The positions of Deputy Executive President, Commissioners and the Secretaries on the administrative side should envisage a team work relationship in which the incumbents would co-operate fully in consultations regarding matters that require assistance from the respective associate in the technical or administrative service field.

e. *Commissioners and Chief Scientists*

121. In order to provide for adequate attention to the large number of specific and diverse problem fields, a technical staff of high competence, including individuals responsible for each major problem field, should be established in the Council. This staff of Commissioners and chief scientists would serve, together with such other officers as are essential, on the Board of Research. They would be responsible, under the co-ordinating leadership of the Deputy Executive President, for the continuous analysis of the overall research needs on problems of regional or national importance in India. The individual members of the staff would be responsible also for constant review of the research in their respective fields, to develop recommendations to the Centre as well as suggestions to the States, relating to improvements or modifications that would be desirable in meeting the critical research problems in those fields.

122. The staff should have responsibility for developing and maintaining adequate procedures for co-ordination of research within their respective fields. They should serve as the principal liaison or contact officials with advisory committees and other organisations concerned with the specific problem areas. They should be individuals with a background of research experience and stature in their respective fields that would assure the recognition and respect of their associates and subordinates in the Centre and State research institutions. They should keep themselves fully informed of the research needs and research progress to insure maximum effectiveness in providing advice and leadership in their respective fields.

123. The technical staff should consist of the following:

A—Agricultural Commissioner

1. Chief of Field Crops and Improvement
2. Chief of Horticultural Crops

3. Chief of Soils and Fertilisers
4. Chief of Plant Diseases and Pests
5. Chief of Agricultural Engineering
5. Chief of Agricultural Economics and Farm Management
7. Chief of Agricultural Education and Home Science

*B—Commissioner of Veterinary Services

1. Chief of Animal and Poultry Diseases
2. Chief of Biological Products
3. Chief of Veterinary Education

*C—Commissioner of Animal Husbandry and Dairying

1. Chief of Cattle Improvement
2. Chief of Animal Nutrition and Feeding
3. Chief of Dairying
4. Chief of Sheep and Goat Improvement
5. Chief of Poultry Improvement

D—Other Staff

1. Statistical Adviser
2. Chief of State Relations
3. Chief of Advisory and Information Services

(A chart is given in Appendix VI)

124. The above staff, on first analysis, may appear to be rather large and represent a considerable expansion over existing personnel. In reality, there is no substantial increase in the number of positions, if the current positions together with the heads of existing services and isolated Advisory posts in the Ministry which should, in the new set-up, be integrated with the Senior Technical posts in the I.C.A.R., are taken into account.

125. The new posts do require individuals of high competence and initiative. The above positions including the position of Commissioners should be considered as a minimum, with attention given to possible expansion or establishment of new posts as the burden of work may require, and for such technical subordinates as each position may need.

126. The majority of the staff positions would cover fields that are self-evident, based on current procedures and experience. The assignment of the field of home science to the Chief of Agricultural Education is in recognition of the relatively modest development in the field of home science at the present time and the need for gradual growth and expansion of this work. Home Science activities are closely associated with educational programmes, so attention to these fields could well be given by one individual. The Chief of Agricultural Education and Home Science would serve as the Executive Secretary of the Indian Council of Agricultural Education, discussed in more detail in the section in this report relating to Education. He should have a background in the field of agricultural education and would serve as the principal liaison representative of the Council in contacts with the colleges of agriculture. A similar position would be held by the Chief of Veterinary Education in regard to the colleges of veterinary science and animal husbandry.

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* See minute of dissent by Shri Lakshmi Sahai—Appendix VIII

127. The Chief of State Relations would be responsible for contacts with the States relating to work supported by the funds provided directly by the Centre to the States on a long-term, continuing grant basis. He should assume responsibility also for the development and maintenance of a complete file of research projects relating to agriculture, including projects supported by the Centre, the States and other organisations. The staff in this unit should include several technically qualified assistants who should be capable of understanding the relationships between research projects, which is essential in the development and maintenance of an orderly record of research under way. These individuals also should serve in visiting the States at least annually to consult with the appropriate State officials regarding the use of the funds and the progress in the projects supported by the Central grants. Their experience in maintaining records of research projects under way would enable them to be of substantial help to State officials in advising on the nature and extent of research in progress in the various fields.

128. The Chief of Advisory and Information Services should be the principal information officer in the Ministry. A major recognised responsibility of the Council is 'to act as a clearing house of information not only in regard to research, but also to agricultural and veterinary matters generally'. The officer in the post of Chief of Advisory and Information Services should be the principal liaison between the I.C.A.R.and the organisations responsible for extension or related programmes. He should work in close co-operation with officials of the N.E.S.-C.P.A. to determine the availability of agricultural research information and develop suitable reports or publications that would translate research knowledge into practical terms. Agencies or organisations outside the Ministry of Agriculture would, of course, be expected to reimburse I.C.A.R. for such special information services.

129. The Chief of Advisory and Information Services would be responsible for co-ordinating (a) scientific and technical publications, (b) popular pamphlets and reports, and (c) special services including audio-visual aids, radio farm publicity and for all information needs and services relating to agriculture. He, similarly, would assume the responsibility, in co-operation with the respective Commissioners and Chiefs, for assembling an annual report to be submitted by the Executive President of the Council to the Governing Body and the Minister of Food and Agriculture. This report should summarise accomplishments and point out critical problems confronting agriculture that need future research attention. The sections in the I.C.A.R. should be suitably rearranged so as to provide technical units to the Commissioners and Chiefs, and administrative units to the Senior Secretary with adequate co-ordinating sections.

130. While the staff, as outlined above, consisting mostly of subject-matter specialists, would serve to plan and co-ordinate research on an all-India basis, and thereby serve as the technical arm of the Ministry of Food and Agriculture with regard to research matters, the Ministry would still require certain additional assistance if it is to perform its responsibilities under the Second Five-Year Plan in a realistic, practical and effective manner.

131. The Plan envisages a number of schemes in the agricultural field to be executed in the States with considerable Central subsidy. Many of these are of a developmental nature, but, nevertheless, they are closely related to research. Further, we have recommended additional assistance to States on research and education. A number of new

post-graduate insitutions and Rural Universities have been recommended to be established on a regional basis. While the States could confidently be expected to implement the schemes efficiently, it would be desirable for the Ministry of Food and Agriculture to keep in close touch with these developments to ensure that the Central funds are utilised for the intended purposes, according to schedules and targets laid down, and that the various difficulties that tend to arise in such activities of joint responsibility are resolved promptly to prevent undue delays. We recommend that for this purpose a desired number of regional advisers*, who need not be subject-matter specialists, may be employed. They should tour the regions frequently and keep the Ministry of Food and Agriculture and Central agencies informed of the progress of developmental schemes in the States. These Advisers, who should work in close co-operation with the senior technical officers of the I.C.A.R., preferably could be located in the regions they serve. They should be represented on the Board of Research and should function as 'end-use' advisers of the Ministry and the I.C.A.R.

f. *Central Research Institutes*

132. One of the principal functions of the Centre should be the provision of special facilities and staff for research on problems of regional or national concern. Such provision is now made through the various Central institutes. These institutes should be considered as executive arms of the I.C.A.R. and should function as the operating side of the Council. While in actual practice such a relation does exist to a limited extent between the I.C.A.R. and the Central institutes, this position should be clearly recognised if these institutions are to be brought into close co-operative partnership with research work conducted in the States.

133. A large portion of the research work done at the Central institutes is sponsored by the I.C.A.R. The Central institutes and the I.C.A.R. could be brought into close working relationship if the Central institutes deal directly with the Council on all technical and administrative matters concerning I.C.A.R. schemes in relaxation of the existing practice of channelling such correspondence through the Ministry. We recommend that while the Central Institutes may continue to be administered by the Ministry, these institutes should have direct relations with the Council on all schemes sponsored by it and Government sanctions should be given by the Executive President on behalf of the Government.

134. The development of national or regional centres should be limited to those problem fields or areas of work in which Centre-supported institutions can function more effectively than individual State research stations, in providing research or testing services required by a number of States. In the execution of research of regional nature, requiring tests in different localities, State facilities should be utilised to the maximum extent possible. The Central institutes should not normally establish branch stations, but rather should operate in co-operation with the State stations to ensure maximum Centre-State co-ordination of research.

g. *Project Co-ordinators*

135. Technical staff and travel funds should be provided by I.C.A.R. for the co-ordination of co-operative regional projects or schemes. The present system of co-ordi-

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* Responsible to Deputy Executive President of same level as Commissioners.

nation of agricultural research in India largely depends upon the review of reports, which may or may not reflect accurately the work under way in the field. For each major project or field of work an individual should be designated as a project leader or co-ordinator, with responsibility for reviewing annually the research under way in the field. He should preferably be actively engaged in research in the problem field which he is serving as co-ordinator. He could be located at either a Central institute or a State agricultural experiment station in the problem area. This individual should serve also as the executive chairman or secretary of a technical committee composed of the Central and State scientists working in the particular problem field.

136. If the project co-ordinator is responsible also for direction of a large amount of research work at his headquarters location, provision should be made for adequate technical assistance of sufficient competence to permit the project co-ordinator to be absent from his station in travel status for several weeks during the crop season or for varying times during the year to visit the co-operative field locations.

137. It should be the responsibility of the project co-ordinator to work with the participating States in the planning of uniform experiments to be conducted at a number of locations in order to acquire the maximum information on a problem within a single season. He should assemble the data and information from such uniform trials and promptly prepare summary reports for distribution to each co-operator, as a basis for planning continuing research.

138. The project co-ordinator should be responsible to the respective Chief Officer covering the broader field of responsibility in the I.C.A.R. For example, the project co-ordinator for potato improvement research would be responsible to the Chief of Crop Production and Improvement in the I.C.A.R. He would be responsible also, in the sense of developing most effective co-operative relations in the joint research programmes, to the officials in a comparably supervisory position at the State level.

139. Where Central institutes exist, for such commodities as potatoes, rice, etc. consideration should be given to the designation of members of the staff of these institutions as project leaders or co-ordinators. In any case, the individual selected for this position must be mutually respected and accepted by the Centre and the State institutions co-operating.

h. *Planning and Review of Research Programmes*

140. The I.C.A.R. and the Commodity Committees now plan their programmes of work annually. Each organisation has a number of scientific committees and the senior scientific personnel of the State Governments, Central institutes and the I.C.A.R. spend a considerable portion of their time on these meetings. Research is of a continuing nature. In our opinion no harm would be done if the I.C.A.R. and the Commodity Committees would plan their programmes of work on a biennial basis. This would enable scientific personnel to spend more time on their own scientific work and field supervision of schemes. Under this procedure the regional meetings would be held only in alternate years to consider a two-year programme. A similar position should obtain with regard to many of the other committee meetings arranged by these organisations.

3. *Organisation at the State level*

141. The organisations for administering research at the State level will vary considerably because of the recognised autonomy of the State in developing such administrative organisations. The Director of Agriculture in the State has the responsibility for research and education activities, and extension work in co-operation with the N.E.S. These Directors should be competent technical men with a background of research training and experience in order to ensure intelligent supervision of these activities. This question will be discussed further under the section of this report relating to administration and personnel management.

a. *Joint Director of Research and Education*

142. In order to ensure maximum co-ordination as well as competent supervision in research and education, responsibility for these technical fields at the State level should be assigned to a Joint Director who, in most cases, may be the Principal of the dominant agricultural college in the State. This arrangement would provide competent technical advice of a high order to the Director of Agriculture and would preclude the development of separate lines of responsibility for teaching and research, now found in a number of the States. The Joint Director, or the Principal of the College, should be a well qualified technical man with a background of training and experience in research. In addition to the responsibility for research and education, this individual also should be in charge of the development of suitable liaison relations between research and extension at the State level.

b. *Technical Advisers*

143. In general it should be the responsibility of the extension staff at the State level, whether such staff is under the Director of Agriculture or associated with the N.E.S. - C.P.A. programme, to see that the information extended to the cultivators is based on the latest reliable research findings. There is need, however, for specialised staff positions to be located in close association with the research stations or colleges of agriculture. These individuals, with a high level of technical competence, should be constantly in touch with the research under way and be in a position to advise the extension workers regarding the practical new results that should be carried to the farmers. These technical advisers associated with the research stations also should serve to assist in planning and conducting field demonstrations designed to evaluate new research findings under field conditions in the various sections of the State.

c. *State Field Stations*

144. The State should assume the major portion of the responsibility for transmitting practical agricultural technology to the farmers. New techniques, crop varieties, fertiliser practices and other improvements must be evaluated under local conditions before being proferred to the farmers for adoption. In order to carry out this responsibility the States must have adequate sub-stations or field locations, representative of the different cropping, soil, and environmental conditions of the State. These field stations should be State-owned and directed. The Centre should not provide stations of such localised application and should support work at such locations only if it is an integrated part of co-ordinated research on a regional or national basis.

4. *Co-ordination of Centre-State research*

a. *Joint Planning*

145. The States should participate fully with the Centre in the development of research of regional nature. This should preferably be done by the qualified technical personnel responsible for research in the specific problem fields in the State, meeting with similar representatives from other States and from the Centre. Provision is made for this in the structure and operations of the I.C.A.R., with State representatives on the Advisory Board and also on the respective technical committees covering specific problem fields. The project leader or co-ordinator provided by the I.C.A.R., as discussed previously, should be regarded as the Executive Secretary or Committee Chairman in the review of the work in these specific problem fields. It should be his responsibility to provide proper records of these meetings to the appropriate administrative officers and technical supervisors at the State and Centre levels.

b. *State Support*

146. In the development of co-operative Centre-State research on regional problems, the State should endeavour to provide laboratory and field facilities wherever possible. This procedure would aid in reducing the development of regional sub-stations by the Centre and thus ensure the retention of a major recognised responsibility for agricultural research by the States. The State contribution to co-operative regional or national research could primarily be in terms of facilities for the research, including land and labour.

c. *Centre Support*

147. The contribution of the Centre should be largely in terms of qualified technical personnel, to be employed by the I.C.A.R. and deputed to the State stations or the field headquarters. Provision of equipment, supplies, local travel and other costs could be joint or by either the State or Centre as mutually agreed to.

d. *Memorandum of Understanding*

148. In order to ensure the maintenance of desirable working relationships, a memorandum of understanding, that includes a brief description of the contributions by the Centre, by the States, and joint contributions to the co-operative work, should be developed. A general memorandum of understanding covering the broad working relationships between the Centre and the States, including questions of publication, control of seed stocks and other material products of research, could be developed for signature of the Executive President of the I.C.A.R. and by the Director of Agriculture (or his Joint Director for Technical Programmes) at the State level. Supplemental documents covering brief descriptions of further mutual understandings for the individual specific co-operative projects could be developed to provide for more detailed agreements. The file of such memorandum of understanding and supplements for the Centre could be retained along with the Central file on research schemes, to avoid excessive duplication of staff. At the State level, this file should be retained either by the Director of Agriculture, or the Joint Director for Technical Programmes, if the responsibility is delegated to the latter position.

III. HIGHER EDUCATION IN AGRICULTURE, VETERINARY SCIENCE AND RELATED FIELDS

A. *Introduction*

149. THE PHRASE 'higher education' as used in this report in general designates education in an institution whose entrance requirement is at least the Matriculation. At present a 'matriculate' in Indian States is one who has passed the examination following the completion of 10 years of public school work. In a few States 11 years of public school work is required and the examination based upon such 11 years of work is called the 'Higher Secondary Examination'.

150. In this section the Indo-American Team is concerned with higher education as related directly or indirectly to *agriculture.* Here will be discussed institutions giving instruction in agriculture or in veterinary science at the collegiate and post-graduate levels. India has recognised that Home Science is of particular significance to agriculture because of its relationship to the farm homes in the village; colleges of home science are, therefore, also included. Basic sciences also find constant application in agriculture, veterinary medicine and home science, and institutions in which there is emphasis upon practical application must be recognized. The field of technology, including engineering, with its many direct applications to agriculture, must have recognition. We are to consider then higher education in agriculture, veterinary science, home science, related sciences and related engineering.

1. *Historical*

151. Only in recent years has there been adequate recognition of the fact that higher education in agriculture and related fields is essential to the economic progress and development of India. While there were some earlier beginnings in agricultural education, such education at the college level and having University recognition is of more recent origin, namely, from the year 1906. Veterinary education has a much longer history, but for many years students who completed a course in veterinary science received a diploma and not a degree. More recently veterinary colleges have raised their standard and have become affiliated to Universities and their graduates now receive a recognised University degree. The first of the institutions so to affiliate was the Madras Veterinary College to the University of Madras in 1946. Only two institutions of college grade in home science or home economics exist at present in India.

152. There is a much longer history of the development of basic sciences having application to agriculture; Botany, Zoology, Chemistry, Physics and other sciences have been taught in the colleges of liberal arts and science for many years. Technology is also relatively old; it has had University recognition for a century. The first technological College to secure such recognition was the Bengal Engineering College which was affiliated to the University of Calcutta in 1857.

2. *Organisation of Higher Education*

153. Indian colleges are of two principal types; some were privately initiated and privately endowed and supported, others were Governmentally founded. The private institutions are autonomous and are not under any direct Government control, except that they have been affiliated to the Universities and have accepted University standards and examinations. In many cases these autonomous institutions now receive Government assistance, usually in the form of grants-in-aid, but this has not made them responsible to any Central Ministry or State Department.

154. Many of the institutions of higher education were initially sponsored and organised by the Government. These institutions are under the immediate supervision and control of the Central Ministries or State Departments. Such Governmentally founded institutions in liberal arts are responsible to the Departments of Education in the States; those in agriculture to the States Department of Agriculture; those in veterinary medicine either to State Veterinary Department or State Department of Animal Husbandry depending upon the organisation within a particular State; those in technology and engineering to the Department of Education; those in forestry to the Central Ministry of Food and Agriculture. Medical Colleges are under the supervision of the State Medical Departments.

155. All colleges are affiliated to or are constituent parts of Universities. In other words, Universities are of two general types, the so-called affiliating Universities which do no teaching, but control examinations and standards of affiliated colleges; second, the teaching Universities in which usually several colleges are located on the same campus and have the same general relationships to the University as do affiliated institutions. A teaching University may also have affiliated colleges.

3. *Functions of Colleges and Universities*

156. The great expansion of the concept of the functions that agriculture must perform in the habilitation of more than a half million farm villages of India has led to increased appreciation that progress can be made only when there is recognition that efforts may collapse if all three legs of the tripod—research, higher education and extension are not all functioning. This has been emphasised by the Union Minister of Food and Agriculture, Mr. Ajit Prasad Jain, in a recent address in which he called for complete co-ordination between the results of research, higher education and extension work if there are to be most satisfactory results. Everywhere the Indo-American Team, in its wide contacts, had found approval of these sentiments and of the desirability and even of the necessity, for this co-ordination, yet nowhere was there found evidence of really effective techniques either on the local or the State or the Union level. This may be due to the fact that in the agricultural and related colleges there has also been some reluctance to recognise the essential inter-relationship of these factors.

157. It is axiomatic that any college which has prestige and standing carries forward the three functions of intra-mural teaching and research, and extra-mural extension of knowledge.

158. In India we find that in practice there are several college levels of insturction. The first two years after Matriculation may lead to the Intermediate examination; after two

to four years of additional work the Bachelor's degree may be obtained, the longer period of time being required of students pursuing special curricula, such as those of human or veterinary medicine. Two additional years are usually required for the Master's degree and at least two further years for the degree of Doctor of Philospohy or Doctor of Science.

159. Colleges exist not only to teach students, but also to preserve and particularly to increase knowledge. A part of the armamentarium of a college for preservation of knowledge is the development of an adequate library ; equally perhaps, even more important is the expectation that any professor or teacher in a college should himself endeavour to add to the sum of human knowledge in his field of specialisation. The teacher who takes no interest in research,or is so overburdened with teaching that he can do no research, is rarely an inspiration or a model for his students. A limited amount of student contact, at least on the post-graduate level, is usually helpful to the man who is carrying on research. A post-graduate student should be in part an apprentice.

160. The third directive to every college is that reasonable efforts should be made to extend knowledge and make known the results of research to the people of the State and the nation. This is ' extension ' work. It may be done at all levels. India is at the present moment almost overwhelmed by the tremendous task she has undertaken in the education of her village people and in an effort to improve their economic condition. Until very recently there has been little or no appreciation that such extension work is logically a part of the duties of any well organised and functioning agricultural college.

161. In the succeeding paragraphs we shall endeavour to point out the organisation and relationship of the Governments, both at the Centre and in the States, to their agricultural and related colleges. This is preliminary to a discussion of the several types and functions of agricultural institutions now functioning in India both at the Centre and the State level.

B. *The Divison of Responsibility Between Centre and States*

162. The Constitution of India sets forth the areas in which there may be legislation in the field of education by the Centre and by the several States, as well as the areas in which there is concurrent jurisdiction. The Seventh Schedule includes three lists ; the first indicating the legislative powers of the Union, the second that of the States, and the third a concurrent list.

Union List

163. In the Union list there are certain items which concern agriculture. The National Parliament may, by legislation, deal with any institute which is declared by Parliament to be an institute of national importance, including institutions for scientific or technical education financed by the Government of India, wholly or in part. It also legislates for Union institutes of national importance for professional, vocational or technical training. It may co-ordinate and determine standards in institutions of higher education of research and in scientific and technical institutions.

State List

164. To the States is allocated the field of University education subject to the restrictions of the Union List above. The State List provides for agriculture, including

agricultural education and research, protection against pests and plant diseases, preservation, protection and improvement of livestock and prevention of animal diseases, likewise for veterinary training and practice, for irrigation and canals, barrages and embankments. It has jurisdiction over forests and fisheries and is the protector of wild animals and birds.

Concurrent List

165. In this list the subjects dealt with are economic and social, such as the standing of the legal, medical and other professions, the prevention of the extension from one State to another of contagious diseases or pests affecting men, animals and plants.

166. In actual practice, there have been worked out allocations of functions to the several Ministries at the Central level and to the several departments at the State level.

C. *Central Responsibilities*

167. There are several Union Ministries which have direct or indirect relationship to agricultural education. These include the Ministry of Education, the Ministry of Food and Agriculture, the Ministry of Natural Resources and Scientific Research, the Ministry of Health, the Ministry of Irrigation and Powers, and the Planning Commission.

1. *Ministry of Education*

168. The Ministry of Education performs at the Central level a number of functions which have some significance in agricultural education.. In the lists of 'Subjects for which the various Ministries and Departments of the Government of India are responsible', one of its functions is recorded as 'co-ordination and determination of standards of higher education and research'. This apparently is effectuated through an Inter-University Board which includes, among others, Vice-Chancellors of the 31 Universities of India. One of its most important actions has been to recommend that the Universities of India confer the Bachelor's degree on the satisfactory completion of three-year curricula with entrance based upon Higher Secondary Examination. Practically this examination is based upon 11 years of public school work. Each University may fix its own standards, but undoubtedly there will be increasing tendency towards uniformity. This regulation naturally has its relationship to the fixing of entrance requirements to agricultural and veterinary colleges affiliated to these Universities.

169. Under the Ministry of Education there is organised a University Grants Commission which allocates funds to the several Universities of India. The Report of the Ministry of Education for 1954-55 states that in approximately three months beginning from January 1, 1954, a total of Rs. 7,22,145 was allocated to 21 Universities. Some of the grants made to institutions may well be on subjects with some direct relationship to agriculture.

2. *Ministry of Food and Agriculture*

3. *Central Research Institutes to which have been assigned higher educational functions*

170. The Ministry of Food and Agriculture has responsibility for several research institutes which have developed over the years certain educational functions. These will be noted at this point but discussed in some details later.

a. *Indian Agricultural Research Institute, New Delhi (Delhi)*

171. In connection with this Institute, there has been developed an Agricultural College which makes use of certain facilities of the Institute. This college is affiliated to the University of Delhi. The Institute has come to be recognised as the most important general post-graduate training centre for students of Agriculture. It is developing additional hostel facilities for a limited number of post-graduate students.

b. *Indian Veterinary Research Institute, Izatnagar and Mukteswar (Uttar Pradesh)*

172. The I.V.R.I. for several years has offered specialised training in a number of fields of veterinary science and animal husbandry (diploma-certificates) and post-graduate training in several fields leading to the degrees of M.Sc., Ph.D. and D. Sc. through affiliated Universities, to those advanced students who are sufficiently qualified. The Institute's research staff and facilities for training as indicated above have been quite satisfactory for a very limited number of students.

173. In the Second Five-Year Plan provision is being considered for establishing at the Institute additional facilities in the way of buildings, equipment and academic personnel for post-graduate training in the fields of Pathology, Bacteriology, Genetics, Physiology, Animal Nutrition and Parasitology. The establishment of this academic post-graduate college at the Institute should be well integrated and co-ordinated with the existing facilities and research personnel to enable it to offer post-graduate education of the highest order in veterinary science and animal husbandry. Graduates of this institution should readily find placement in the various State Colleges of Veterinary Science and Animal Husbandry, State and National Veterinary Research, regulatory and diagnostic services and Biological Products Laboratories.

174. The establishment of this post-graduate training at the Indian Veterinary Research Institute should be done with very deliberate and careful planning from all aspects, including administration, staffing, academic and research instruction, financing and co-ordination with the existing facilities and personnel at the Institute. The Team suggests that the Government of India give serious consideration to establishing this post-graduate college of veterinary science and animal husbandry which should be affiliated to a University.

175. It is the opinion of the Team that certain personnel of the Indian Veterinary Research Institute should be joint staff members with this teaching institution. The college should have as its head a Principal responsible directly to the Director of the Institute.

c. *Indian Dairy Research Institute, formerly at Bangalore (Mysore), now the National Dairy Research Institute, Karnal (Punjab) with a branch at Bangalore (Mysore)*

176. Opportunities for refresher courses and post-graduate work in connection with the research of this Institute have been developed at Bangalore. It is anticipated that upon removal of the headquarters to Karnal the facilities will be greatly improved. This institution should become an important post-graduate agency. It is suggested that careful consideration should be given to co-operation between this research institute and the agricultural college of the Punjab located at Ludhiana, and to affiliation of the Institute to the University of the Punjab.

d. *Central Sugarcane Research Institute at Coimbatore (Madras)*

177. This is one of the most important sugarcane institutes in the world. It is well equipped and staffed for research in the field of sugarcane breeding, but it does not have the teaching facilities essential for post-graduate instruction. It is, however, adjacent to the Agricultural College at Coimbatore which has teaching staff and other facilities. It is suggested that these research facilities, particularly appropriate for post-graduate work, be co-operatively utilised with the teaching facilities at the agricultural college for post-graduate training in sugarcane breeding and the award of post-graduate degrees through the Universtity of Madras.

e. *Central Rice Research Institute, Cuttack (Orissa)*

178. The excellent research facilities on rice of this Institute should be similarly utilised for post-graduate training and the award of post-graduate degrees through the newly developed agricultural college at Bhubaneshwar affiliated to the Utkal University, Cuttack.

f. *Central Potato Research Institute, Patna (Bihar)*

179. Here is centred the very important potato breeding and potato development programme for all India with its special breeding station at Simla. The special research facilities should be open to advanced students for post-graduate training through the agricultural college at Sabour affiliated to the University of Patna.

g. *Central Jute Research Institute, Barrackpore (West Bengal)*

180. This institute is the centre of work in the breeding of various fibre crops, principally jute. New research laboratories are being occupied and apparently research of quality is being carried forward. It is suggested that adequate liaison be established whereby post-graduate students may have access to its facilities and suitable members of its staff recognised for giving instruction through the Agricultural College of West Bengal affiliated to the University of Calcutta.

4. *Union Scientific Laboratories and Related Institutions*

181. There are, in addition, a number of national scientific and related laboratories in India responsible through the Council of Scientific and Industrial Research, to the Ministry of Natural Resources and Scientific Research. Several of the laboratories responsible to this Ministry carry on research which is directly or indirectly significant in agriculture and which in most other countries would be responsible to the Agriculture Ministry or be controlled by the Agricultural Experiment Stations. The Team finds that there is no clearly defined allocation of functions between these Institutions and the several Central Research Institutes discussed above and the Agricultural Experiment Stations of the several States. As these excellent laboratories are located in close proximity to some of the agricultural colleges and institutes providing post-graduate teaching, they should develop close working relations so that post-graduate students in agriculture can make use of the facilities in special but related fields of agricultural research. Those laboratories seemingly significant to agriculture are the following:

a. *The National Chemical Laboratory, Poona (Bombay)*

182. This laboratory is exceptionally well housed, equipped and staffed. Among its directives are that it should carry out investigations into the utilisation of Indian products and give assistance to industries in the development of such utilisation. It is also directed to undertake studies of fundamental chemical significance. This laboratory will inevitably become the training ground for students wishing to take advanced work in chemistry and in chemical utilisation of Indian products. The most important products to be worked are those of agricultural origin. It is suggested, therefore, that some suitable liaison be developed with the Agricultural College at Poona and affiliation effected to the University of Poona.

b. *The National Physical Laboratory, New Delhi (Delhi)*

183. This laboratory is housed in a very modern and well-equipped building; it has a competent staff. Like the National Chemical Laboratory, one of its directives is to carry out fundamental research. Its location within a short distance of the Indian Agricultural Research Institute should make possible close co-operation in some matters. It is noted, for example, that this laboratory is equipped with an electron microscope, and has been using it in a study of some plant and animal viruses. This is a good example of sharing the use of rather expensive equipment, particularly equipment which requires for its operation a high degree of technical competence. This laboratory, we understand, also operates a service for photostating and micro-filming library material for the use of scientists throughout India. This service is important and should be widely utilised. New Delhi is one of the two or three centres in India where reasonably adequate library facilities exist and for a long time the scientists spread over India will need this help from the Centre. The National Physical Laboratory will also inevitably be a great centre for advanced students in the field of physics and adequate provision for those whose interests are also in agriculture should be made.

c. *Central Food Technological Research Institute, Mysore*

184. This laboratory is primarily concerned with the processing of certain foods and is of very direct interest to agriculture. Close liaison between this institution and the Indian Council of Agricultural Research should be developed. In other countries work of this nature is considered a part of agriculture. Here again, there should be adequate opportunity for students interested in agriculture to secure post-graduate training.

185. Among the other nine laboratories responsible to the Council of Scientific and Industrial Research only two laboratories seem to have any significant relationship to agriculture. These are the Central Leather Research Institute at Madras and the Central Drug Research Institute at Lucknow. Here again, as the primary purpose is utilisation of the products of the farm and field, agricultural post-graduate teaching liaison should be developed.

D. *State Responsibilities*

186. Many of the colleges in the States have been founded by the Governments of the States. These include most of the agricultural colleges (28 in number) and all the

veterinary colleges (14 in number). These are all under the Departments of Agriculture or Veterinary Science. The States have also assumed through their Departments of Agriculture major responsibility for the operation of the emergency one-year basic agriculture schools and six-months extension training centres for the training of village level workers. Several States have also vocational agricultural schools.

187. Agricultural colleges founded by private endowment are three in number. They are the Agricultural Institute, Anand (Bombay State), Balwant Rajput College, Agra (Uttar Pradesh) and the Allahabad Agricultural Institute, Allahabad (Uttar Pradesh). There are two privately owned Home Science Colleges—Lady Irwin College, New Delhi, and the Baroda College of Home Science.

1 *Organisation and problem of Agricultural Colleges*

a. *Organisation*

188. Each Government Agricultural College is headed by a Principal who is directly responsible to the Director of Agriculture in the State. The financial support is channelled through the Department of Agriculture which approves the budget. The number and grades of posts are also determined by the Government. All Colleges of Agriculture are either affiliated to or are the constituent colleges of the Universities. The relationship on the one hand to the State Department of Agriculture and to the University on the other creates some problems of administration. These problems are common to all Government Colleges and they are considered later under the heading of ‘ Relationships between Colleges and Universities ’.

189. More than half of the Colleges of Agriculture were visited by the members of the Team. Many are well-housed, well-equipped and well-staffed. Several new colleges have been recently authorised and are being developed. The Government has in general been generous in providing buildings and land. It has been less generous in some cases with reference to equipment. The students and staff, therefore, work at such institutions under a handicap. By and large, the provision for staff has apparently been the least generous.

190. The Colleges are so distributed as to serve well all the geographical areas, with the possible exception of Jammu and Kashmir.

191. The Colleges of Agriculture have been conceived and developed with the primary purpose of preparing young men to enter Government service. Inasmuch as the positions to be held were varying in nature, almost no opportunity for specialisation at the under-graduate level was provided. The intent has been to develop ‘ multi-purpose ’ men who could fit reasonably well into any one of several types of jobs. The curriculum was, therefore, quite uniformly inelastic. This system of uniform training seems to have proved satisfactory to the present time, but may require some rethinking in the near future.

192. What are the types of position that recipients of the B.Sc. in Agriculture will be called upon to fill ? Are they sufficiently diverse as to require differences in preparation at the under-graduate level, or should all specialisation continue to be deferred to the post-graduate years ?

193. The pressure on these colleges will continue for the preparation of students for all the types of jobs filled in the past. There seems to be no serious dissatisfaction with the agricultural curriculum as now found in the colleges. There is, however, a new and increasing pressure to prepare students for certain specialised services, particularly those relating to the Community and National Extension Projects. The present *ad hoc* schools for training men to meet the present emergency will soon dipsappear and these extension positions will increasingly be filled by college graduates. However, most of the Agricultural Colleges do not offer specialised courses in agricultural education or extension methods, or provide facilities for work in villages. Provision should be made for the requisite additions to the curricula and for village laboratory facilities.

b. *Relationship to Research*

194. Many of the Colleges of Agriculture are now recognised by the Universities to which they are affiliated for giving work leading to the higher degrees of M.Sc., Ph.D. and D.Sc. Frequently there is provided a suitable farm and other facilities for carrying on research. These are essential if post-graduate instruction is to be made functional. No agricultural college should undertake post-graduate instruction unless the members of the faculty engaged in such instruction are themselves carrying on significant research.

c. *Problem of relative autonomy*

195. Three patterns of State relationship to State-supported institutions of higher learning have been evolved in various countries. In some countries, each institution is responsible to and is under the general authority of a Ministry or Department of the Government; in some only technical and professional institutions are so related to a Ministry; in the third group the educational institutions of whatever type have a high degree of autonomy, frequently almost complete. India has chosen a somewhat intermediate position, granting a very large degree of autonomy to her Universities and to their affiliated colleges which were not originally Governmentally sponsored. All educational institutions which were founded by the Government are 'under' one of several Ministries or Departments. Of the institutions of higher education founded by the States, the agricultural and veterinary colleges are under the jurisdiction of the Departments of Agriculture and Veterinary Science; the liberal arts and engineering colleges under the Department of Education; and the colleges of human medicine under the Medical Department. The immediate responsibility in agriculture is usually to the Director, and through him to the Secretary and to the Minister. A veterinary college is usually supervised by a Director of Animal Husbandry or of Veterinary Services. These institutions are subject to very close supervision, but we would like to see the Principals of these institutions given more freedom of action in the internal administration of the colleges. In most countries, it is recognised that there is a high degree of correlation between the relative autonomy of colleges and Universities and their efficiency and prestige. The Team recognises the real advantage of University and college autonomy and would hope that this would increase substantially in the future. It believes that better and more uniformally satisfactory working relationships can and must be developed between the agricultural and veterinary colleges and the supervising Departments of Agriculture.

196. The problem of the degree of institutional autonomy needed should be carefully considered by the Indian Council of Agricultural Education. It is believed possible that

material improvement could be made without interfering, in any substantial way, with the supervision exercised by the Departments of Agriculture. Several points may well be considered:

(1) The Department of Agriculture should expect to continue to receive through the graduates of these institutions men adequately trained to take the government jobs for which recruitment is required.

(2) The Department of Agriculture should expect adequate technical assistance in the tremendously augmented programme of agricultural extension, both in the training of men for positions in the Extension Services and in answering the numerous technical and scientific problems which continually arise in agriculture.

(3) The Department of Agriculture should continue to allocate the funds to these institutions and give final approval to their budgets.

197. Some increased autonomy, and, we believe, some increased efficiency consequent upon autonomy, might be secured through the following:

The Principal of the Agricultural or Veterinary college as the head of the institution should be regarded as the authority having the fullest responsibility over the internal administration relating to teaching.

2. *Organisation and Problems of Professional Veterinary Education*

a. *The Colleges of Veterinary Science and Animal Husbandry*

198. Formal education (training) in veterinary science in India dates back to August 2, 1886, when the Government of Bombay opened a Veterinary College. For several years thereafter, this college supplied veterinarians to all India. Subsequently, additional veterinary colleges were established by other State Governments.

199. Having this early origin it would be expected that veterinary education would have developed to a high level, comparable at least to other professions. This, however, does not seem to have taken place. The factors which may have contributed to this slow progress in veterinary education may be as under:

(1) For many years the main object of veterinary education in India was to train people to serve as stockmen to perform the duties of vaccination, castrating and simple treatment of animal wounds; trained veterinarians for diagnosis and research were recruited from the United Kingdom.

(2) The necessity and importance of having a large force of trained veterinarians in India to administer to the livestock and poultry industry were not fully visualised or appreciated.

(3) Insufficient financial support and insufficient employment opportunities for graduates in veterinary science.

200. In recent years, the importance of education in veterinary science, animal husbandry and livestock, dairy and poultry production has become recognised. Trained graduates in veterinary science and animal husbandry are now in great demand to provide the essential services in the expanded agricultural extension and Community Development

Programme that India has undertaken. Consequently, new impetus has been given to training in veterinary science and animal husbandry; colleges have been reorganised, new colleges have been set up and now instruction is offered leading to the degree of 'B.Sc.' in veterinary science and animal husbandry. In spite of these efforts, development of the colleges has not kept pace with the needs for sufficient trained personnel in India's expanding agricultural development programme.

b. *Entrance Requirements*

201. In most of the colleges of veterinary science, which started as separate institutions and were not affiliated to any University, the entrance requirement initially was Matriculation followed by three years of study in the college. Upon completion of the not too intensive course, the student was awarded a diploma by the college. In recent years, the entrance requirement has been changed to the Intermediate Science Examination. About 10 years ago the first veterinary college became affiliated to a University with the objective that this affiliation would strengthen its course of instruction and thereby improve the quality and status of its students. In the last few years, all of the remaining colleges and the new colleges with the exception of one college, have been affiliated to the Universties. Upon completion of the course of study the student is presented to the University for the degree examination, and, if successful, is awarded the B.V. Sc. and A.H. degree. The Team had the opportunity of visiting seven of the ten older colleges of veterinary science and animal husbandry, but unfortunately saw none of the newly organised colleges.

202. The Team did not make a detailed study of the teaching programme of each college. However, it did examine the grounds, buildings, lecture rooms and laboratory facilities, the prospectus, syllabus, time-table and faculty rolls; also the programme of study and problems were discussed with the Principal and members of the Teaching Faculty and the State Agricultural officials concerned with the financial and administrative functions of the colleges. The colleges of veterinary science and animal husbandry like the State agricultural colleges are State-owned and operated institutions and with the exception of occasional grants from the Centre are financed by the State Governments. In general, they are the administrative responsibility of the Departments of Veterinary Services within the State. The following remarks, therefore, are *general observations* and need not be construed as applying specifically to each of the veterinary colleges.

c. *Teaching Faculty and Students*

203. The size of the teaching faculty of the various colleges in general is inadequate to cope with the large student enrolment. Some members of the teaching faculties do not possess sufficient academic attainment or proficiency to provide instruction at a level necessary for the B.V.Sc. and A. H. degree. The main deficiency noted is that the student-teacher ratio in many of these colleges is far below what is regarded as accepted standards and the problem was particularly pronounced and certainly exists in colleges where, as an emergency measure, enrolment was increased greatly beyond the average *admission.* The deficiency in academic attainment of the teaching faculty is undoubtedly due to the fact that many of the members employed for teaching were graduates of colleges under the old system of training individuals for field service and, therefore, were not given sufficient academic training to prepare them as teachers. In addition, many of them have not had the opportunity of pursuing post-grduate work in veterinary science either in India or abroad or of conducting

research work in the college to better prepare themselves to become good teachers. In addition, the Team found no evidence that the teaching faculty had attended from time to time special teaching conferences of short duration and of intensive nature in the subject matter fields. These teachers, training conferences are exceptionally beneficial in disseminating new knowledge and new methods of teaching procedures for the class-room and laboratories. Another factor contributing to the apparent lack or a low development of a strong faculty in some colleges is the present seniority system of promotion for faculty members. Teachers occupying lower posts, therefore, have little prospect of advancement within the college organisation on the basis of merit or competence, and consequently are not stimulated to self-improvement.

204. The Team was greatly concerned about the number of students in proportion to the number of teachers in all colleges. Because of the double-shift programme instituted in some colleges of veterinary science and animal husbandry and the increased need for stockmen posts at the village level in India's multi-purpose extension programme, the number of students has been greatly increased without a corresponding increase in the number of teachers. While most colleges selected for the double-shift programme were authorised to add a few additional teaching posts, the common complaint, nevertheless,was that the personnel was not available. To cite an example of the situation as indicated above, one college is providing instruction to over 400 students with 16 Professors, Lecturers and Demonstrators. Another college having 37 teaching members now has an enrolment of about 600 students, expects 800 next year and possibly 1,100 the following year. The faculties have not been increased and there is little prospect of increasing them. It, therefore, becomes apparent that adequate instruction cannot be provided for such a large number of students without increasing the size of the faculty and facilities of the college. Theoretically, if the student body is increased by one-third or one-half over normal, there should be a corresponding increase in teaching posts and additional facilities for laboratory and equipment. This situation may have very serious implications and repercussions in the future in so far as securing qualified veterinarians for their active role in the verterinary and animal husbandry field services, in colleges for instruction and research, and in other organisations, such as research, diagnostic and serum-vaccine laboratories. Certainly mass-education on this scale leads to inferior instruction.

d. *Teaching and Research*

205. Some colleges of veterinary science and animal husbandry should be highly commended for having recently instituted research projects as a portion of the faculty duties in the respective fields. It is also gratifying to note that at least two colleges now offer post-graduate work and that some more plan to introduce post-graduate training leading to the degrees of M.Sc. and Ph.D. by 1956. Elsewhere in this report the Team has drawn attention to the quite adequate facilities existing at the Indian Veterinary Research Institute for post-graduate instruction in veterinary science and animal husbandry. The establishment of an academic post-graduate college at this institution should, therefore, to some extent, relieve the pressure or the necessity for students leaving the country for post-graduate training abroad.

206. From a study of the prospectus and syllabi of the various colleges of veterinary science and animal husbandry one gains the impression that in general they are quite

similar. However, in practice this is not the case. The various colleges differed considerably in the emphasis placed upon the teaching of the required prescribed course work. For example, animal parasitology might be strongly emphasised and require a considerable time for teaching at one college, whereas at another college this subject may be passed over quite lightly. The same is true of the area of clinical medicine and its application. For example, one college had practically no large animal clinical cases per year. The training and experience gained from observing and handling and treating a large number of clinical patients are essential for rounding off a student's practical education. A contributing factor to the lack of sufficient clinical material for proper instruction in the field of clinical medicine is the location of some colleges within large urban areas from which the animal population has gradually been removed or greatly decreased. Also transportation problems make it impossible for owners to get their animals to the college hospital. In addition, the colleges in question have insufficient funds with which to establish ambulatory clinical facilities to take students to the fields, or to bring animals into the college hospital to make up for this deficiency of clinical material.

207. In a few institutions it was observed that text-books were not required in important subjects or that the text-books used were not sufficiently applicable or were obsolete for present-day teaching.

208. Very few colleges of veterinary science and animal husbandry have adequately trained personnel to meet the University requirement for offering post-graduate work in a specified area. This has been a serious defect in the educational system of the veterinary profession. Students wishing to pursue advanced training for the most part have been forced to go abroad for this purpose.

e. *Buildings and Facilities*

209. The Team observed that the grounds, buildings and equipment were most inadequate for good instruction at some colleges and moderately good to quite adequate at other colleges. Available land and facilities for the teaching of the practical courses in animal husbandry varied markedly, and at some institutions were quite inadequate. In general, the activities of the various departments or sections of the college were too widely scattered to make for good efficiency. For example, a department of clinical medicine occupied one building for surgery, another for pharmacy. Students and faculty alike could, therefore, not efficiently attend to the clinical patients without a good deal of confusion and loss of time. Another college maintained three widely separated hospitals—one for dogs and cats, another for cattle, sheep and goats, and still another for horses. This arrangement makes it practically impossible to use the clinical patients to the fullest advantage for student instruction and leads to needless duplication of equipment and labour. Another very noticeable deficiency in most colleges was the inadequate lighting of lecture rooms, laboratories and surgical rooms.

210. The laboratory equipment, teaching aids, etc. for normal student enrolment were quite adequate at a few colleges and quite inadequate for the present and contemplated student enrolment at those colleges conducting expanded training programme.

211. The Team was cognisant of many great improvements that had been made in the way of new buildings and new equipment at several institutions in recent years and also

the contemplated improvement in some existing colleges. This reflects a steady growth and progress of the institutions.

212. A good library and library facilities are quite essential for a well-rounded education in any field. Here again, the Team observed a great variation among the colleges of veterinary science as regards the number of books, journals, bibliographical aids, facilities and financial support for the libraries. The impression was also gained that in some institutions, ample opportunity was not afforded to the students to use the library and its facilities. In the absence of a trained librarian, books under lock and key seldom make a substantial contribution to the training of students.

f. *Syllabus and Examination System*

213. During its visits with teachers of the agricultural colleges and colleges of veterinary science and animal husbandry, the Team was impressed by the dissatisfaction that exists in the colleges with the syllabus system of teaching, and the University examination system. We gained the impression that the system was unsatisfactory because it led to mediocrity of teaching, lack of academic endeavour upon the part of the students and disciplinary problems. These have been dealt with more fully elsewhere.

214. Because the colleges are separate entities for the most part, the students do not have the opportunity of being exposed to a wholesome University atmosphere. Students of colleges of veterinary science and animal husbandry receive no instruction in the social or cultural sciences, and this, in the Team's opinion, is a serious mistake; the educational process should include some non-technical courses.

215. The colleges of veterinary science and animal husbandry are for the most part woefully deficient in research endeavour, animal disease diagnosis procedures, and post-graduate training facilities, all of which are important in the development of a sound educational programme.

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216. Because of the observations cited above and many others not cited, it is the conclusion of the Team that education in veterinary science and animal husbandry has not had the requisite attention and support that it deserves and consequently the standard of training for qualified personnel has been inadequate for India's needs. Furthermore, the importance of animal husbandry in its broad aspects has been and is being neglected in most areas of India because of insufficient emphasis placed upon training in its main fields within the colleges of veterinary science and animal husbandry and in some colleges of agriculture.

217. The American Veterinary Medical Association, through its 'Council on Education' composed of nine Doctors of Veterinary Medicine has for many years functioned as the recognised accrediting agency for colleges of veterinary medicine in the United States. A sub-committee of the Council of Education inspects each veterinary college at least once every three years and appraises the institution for its ability to function in the field of higher education.

218. The Council has developed minimum essentials for an acceptable (approved) College of Veterinay Medicine, and these are revised from time to time to keep pace with the development of newer knowledge.

219. These essentials of an acceptable Veterinary Medical School (College) have been most beneficial in regulating the quality and promoting a relatively high uniformity of veterinary education in the United States. Appendix VII is a copy of the 'Essentials of an acceptable Veterianry Medical School', as publised in the 1954 edition entitled, 'Directory of the American Veterinary Medical Association', Chicago, Illinois.

3. *Organisation and Special Problems of Home Science College*

220. India is increasingly aware that any upward trend in the levels of living of the farm families in five lakh agricultural villages must include not only improvement in farming but improvement in living, not only better agriculture, but better homes and families. The goal of home improvement cannot be achieved without educating more than 170 million village girls and women to cope more effectively with the problems of the village home.

221. India has not yet conquered excessive infant mortality in the village. Fifty out of every hundred village children die before the age of five. Anti-malarial campaigns, provision of better water supplies, higher standards of sanitation, these are increasingly effective. Any marked decrease in morbidity and especially infant mortality in the village will depend largely upon women bringing sanitation effectively into the daily life of the family together with knowledge of the practical phases of home nursing, some elementary understanding of nutrition and its importance, particularly in childhood, child care and training, the ability to choose intelligently between that which is good in traditional habits of life and that which should be modified by the directives of modern science. The mother and wife is the home nutritionist, dietician, sanitarian and nurse.

222. What has been done in India to supply for the home the assistance and guidance in education and research that have been supplied for the farm by the establishment of agricultural colleges and experiment stations?

223. There is evidence of the appreciation of the need, but progress has been slow. Two institutions of college grade and with University recognition and affiliation have been established. One, the Lady Irwin College, an affiliated institution of the University of Delhi is privately endowed, and the second at Baroda is also a private institution of Baroda University. These institutions include in their curricula some introduction to basic sciences, and reasonably adequate development of the special disciplines in the field of home economics, such as dietetics, home management, nutrition and child care and training. The graduates, in so far as they enter professional work after graduation, become teachers in secondary schools and colleges. The development of these two model home science institutions has been the result of the work of a devoted group of capable Indian women. They have been responsible for the endowment of Lady Irwin College and the establishment of the college at Baroda and for the rapid development of standards leading to University recognition or affiliation.

224. There has been a marked increase of interest in home science in many women's and liberal arts colleges. Fourteen such institutions have provided for sections (departments) of home science. Others are desirous of taking this step, but must wait because of a shortage of qualified teachers. These institutions have not to the present time engaged directly in the training of girls for work in extension in the Community Projects.

225. The Team believes that the future development in the field of home science should follow somewhat the pattern of agricultural college education, and that in the near future, there will be insistent demand for the creation of additional colleges of home science. These colleges should have as their function the training of women to take their place in several vocations. With the development of the multi-purpose schools in the scheme of secondary education the subject of home science should be included in the curriculum and the colleges of home science should be in a position to meet the demand for teachers. In these colleges, those women should be trained who have a village background and are willing and anxious to work at the village level for the improvement of the village home. In the beginning, with the emphasis on health and education in the Community Projects, many more women will be required for the village programme. The newly planned vocational district schools, perhaps of the Manjri type, may have a function to perform in supplying this demand. With the development of the Second Five-Year Plan and in the light of future needs it is advisable that India should train a considerable number of women at the college level. Increasingly those men employed in agriculture at the village level will have college training; it is equally advisable that the women similarly employed should have a corresponding background of education.

226. In the development of additional Government colleges for home science plans should be made to locate them on the same campus, wherever possible, with the colleges of agriculture. The women who expect to do village extension work should have training in some agricultural subjects. Furthermore, both agricultural colleges and home science colleges should have associated with them and readily available for laboratory work, a group of typical agricultural colleges. A part of the curriculum in home science, just as in agriculture, should include opportunity for practical training in work in the villages.

227. Another function of the home science college should be to carry forward research in appropriate fields. There are many problems such as those in human nutrition, dietetics, biological chemistry, art and home management which justify the development of research. Some of the women who graduate should continue in post-graduate training in the appropriate fields to become college teachers in home science institutions, and to carry forward research in appropriate fields. One of the functions of the Indian Council of Agricultural Education should be to further the development of institutions of this type. This work is so important that it might well receive special consideration, quite possibly Central subsidy.

228. Certainly, wherever the development of Rural Universities is contemplated, there should be included in the plan provision for the eventual organisation of a college of home science.

4. *Organisation and Functions of the Indian Council of Agricultural Education*

229. One of the most significant agencies of agricultural education in India is the Indian Council of Agricultural Research (I.C.A.R.). Under this organisation is the Indian Council of Agricultural Education. This latter includes in its membership all the Vice-Chancellors of the Universities which have either constituent or affiliated colleges of agriculture or veterinary medicine, also the Deans of the Veterinary or Agricultural Faculties at these institutions, and the Principals of all the agricultural and veterinary colleges in which

the Principal is not already represented by virtue of his position as a Dean. The Directors of the Central Agricultural Research Institutions in which there is a provision for post-graduate work, including the Indian Agricultural Research Institute, the Indian Veterinary Research Institute and the National Dairy Research Institute are also members of this Council. Included also are the Inspector-General of Forests, the Fisheries Development Adviser, the Plant Protection Adviser and other heads of Departments who are in some way or other connected with training or research in their repective fields. The Secretary of the Indian Council of Agricultural Research is also the Secretary of the Indian Council of Agricultural Education. The Council functions largely through the Executive Commitee consisting of a Chairman and six members who are elected by the members of the Council. As at present constituted, it includes three Principals of the Agricultural Colleges and three Principals of the Veterinary Colleges.

230. During its formative stages of development the Indian Council of Agricultural Education had no very clear-cut directives. These directives, however, under the present stress of circumstances are rapidly emerging. It is quite imperative, therefore, that the Council should take leadership and function effectively in appropriate fields. The Team feels that among these important functions the following may be emphasized:

(1) The Council should function as an agency for bringing about somewhat greater standards of uniformity in the agricultural curricula of the colleges, leaving, however, reasonable opportunity for adaptation to State and local conditions. The Council furthermore should be given the necessary assurance and status that it will be continuously associated by Government with the various measures it takes from time to time in developing agricultural education.

(2) The Council should constitute a forum for the discussion of problems of higher education that relate directly or even indirectly to agriculture. This should be established in the form of a Journal of Agricultural Education which would include within its purview discussions concerning education in the fields of agriculture, veterinary science, home science, forestry, fisheries, dairying and animal husbandry and sciences related to agriculture and agricultural engineering. It should also contain articles relating to the organisation and techniques of agricultural extension.

(3) The Indian Council of Agricultural Education has decided to function primarily in the immediate future in two fields, viz. (1) Agricultural Education and (2) Veterinary Education. It has resolved itself into two working groups or Standing Committees, each primarily concerned with its own field. These Committees are expected to make studies and surveys and to prepare recommendations concerning standardisation of curricula and the establishment of minimum standards which should be maintained in the curricula of the colleges of agriculture and veterinary science. It is understood that the recommendations proposed by either working group must secure the approval of the Council as a whole.

(4) There has recently been developed a movement to organise veterinarians in each of the State into a State Veterinary Association. These have been associated, so far as formed, into an Interim National Veterinary Council.

On the Veterinary Council are elected representatives of the several State Associations. Inasmuch as it is quite appropriate that this National Veterinary Council also have a voice in the decisions reached by the Indian Council of Agricultural Education on matters relating to veterinary education, it is recommended that appropriate measures be taken to secure representation of the National Veterinary Council. This would make it possible for adequate liaison between the Council of Agricultural Education and the veterinary profession. Recommendations prepared by the National Veterinary Council could be transmitted for implementation through its elected members.

(5) Inasmuch as home science education is apparently rapidly assuming significant status in India, and since home science education is admittedly to be related to agricultural education, it would seem wise to include in the membership of the Indian Council of Agricultural Education the Principals of the colleges of home science.

5. *Relationship Between the Universities and the Agricultural and Veterinary Colleges*

231. All agricultural and veterinary colleges in India follow the University of London tradition of affiliating to Universities which conduct examinations, approve syllabi and curricula, specifically lay down the qualifications of those authorised to direct post-graduate studies and participate in the determination of requirements for admissions to colleges. Each of these inter-relationships poses certain problems.

a. *The Problem of the University Examination*

232. During our visits to agricultural and veterinary colleges we have noted on several occasions dissatisfaction on the part of some members of the staff relative to certain relationships between the Universities and the colleges, the commonest being that of the examinations. That such dissatisfaction is not unreasonable is manifest from the reports of various investigating Committees. The subject is well covered in the *Report of the University Education Commission*, Volume 1, 1950.

233. The problem is in part aggravated by the very great number of individual examinations which must be given annually by the Universities. The Commission states that the Calcutta University Commission (1917-19) showed concern at the rising numbers involved in these examinations. The number has gone on increasing while the character of examinations has remained unchanged.

234. Four types of examinations apparently are involved : the Matriculation examination (perhaps also the Higher Secondary), the Intermediate examination, the examination for the Bachelor's degree and examinations for higher degrees, including Master's and Doctor's. In 1947, there were over 80,000 candidates for the Intermediate and 32,400 for the Bachelor's examinations. We may quote the Commission :

> " An unsound examination system continues to dominate instruction to the detriment of a quickly expanding system of education. In our visits to the Universities we heard, from teachers and students alike, the endless tale of how examinations have become the aim and end of education, how all instruction is subordinated to them, how they kill all initiative in the teacher and the student, how capricious, invalid,

> unreliable and inadequate they are, and how they tend to corrupt the moral standards of University life."

Again they state:

> "The chief purpose of the present examinations is not organically related to the actual process of education. They are means to the giving of a hall-mark of competence which employers, public and private, may recognise as a more or less reliable indication of the possession of certain intellectual and, perhaps, moral qualities and of certain types of knowledge and skill. A University degree is a kind of passport for jobs. With the great economic pressure due to the prevailing poverty in the country, the insistence on a University degree as the minimum requirement even for posts of minor officials and clerks has put a premium on a number of evils which have come to be associated with the examination system. It has subjected teaching to the examination, made it almost impossible to provide true education and to develop wider interests, and has created temptations of cheating, corruption and favouritism. The obsession to secure, as it were, a ticket in the lottery of job-securing has over-shadowed the educational purposes which a good examination can serve."

235. The Commission did not recommend that examinations be abolished, but that there be a thorough-going reform.

236. The Team has studied the specific recommendations of this University Education Commission relative to the system of examinations and wish to urge that they be implemented.

237. The system of examinations was originally developed primarily for the use of liberal arts institutions. An agricultural or a veterinary college is an institution *sui generis.* It is our understanding that in the formulation of the examination questions, there is agreement between the examiners chosen from within the institution and from outside. In spite of this we feel that in many cases the examination questions are confined too strictly to the skeleton of a finalised syllabus.

238. A University may have affiliated to it a large number of liberal arts colleges. All students who go up at one time for examinations from these colleges must perforce take the same examination. In order to prepare students for their examinations, it is necessary that there be a very high degree of standardisation in the courses as they are taught in the several institutions. This is in contrast to the situation with reference to agricultural colleges. Rarely is there more than one agricultural college or veterinary college affiliated to an University. The Team fails to see why the formal liberal arts type of examination should be in all its aspects imposed upon these institutions inasmuch as the type and purpose of education in these technical colleges is quite different. Freeing these colleges entirely from the domination of the Universites in the preparation and grading of the examinations might be suggested but under present conditions such a step is probably impracticable. The teacher of each major subject in the agricultural and veterinary curricula should have a voice in the formulation of questions. The University Education Commission has urged that a determination of the student's final standing should be based not only upon the final exa-

mination but likewise upon the quality and character of his work in the college. We would urge that the teacher evaluate the quality of the work of the student at least upon the completion of each course and that for the purpose of the final assessment certain credit may be given to the work done by the student during the college year.

239. The University Education Commission recommended that a University degree should not be required for selection to Government Administrative Services. Special set examinations for recruitment to the various services should be organised and should be open to whosoever cares to take them. With this the Team would agree but would not wish to subscribe to this policy for recruitment to a technical service, if it is a professional job to be filled such as requires a college-trained individual who should have the University stamp of approval as to his professional qualifications.

240. We concur further in the recommendations of the University Education Commission that no one should serve as an examiner in a subject which he has not taught for at least five years. Strictly intrepreted this would mean that an examiner in veterinary pathology should have taught this particular subject for a period of years. The examiner should know not only the basic science, but the technical applications as well.

b. *The Problem of the Syllabi*

241. The Indian Universities designate as a syllabus the general outline or content of a subject. This is formulated with considerable particularity and is usually published. In a technical institution such as an agricultural or veterinary college, the syllabus for a particular subject is prepared by the Board of Studies and submitted to the appropriate University bodies for approval. The University performs several functions. The syllabus is scrutinised to determine whether it is adequate and suitable for instruction at the University level. Its appropriateness for use in each of the colleges, if there is more than one affiliated college of the same type, may be evaluated. A syllabus when prepared should reasonably meet the needs of all the affiliated colleges and serve as an outline for the preparation of the uniform examination to be set by the University. The necessity for harmonising recommendations from numerous institutions does not arise in most cases with the agricultural and veterinary colleges as usually there is but one affiliated college in a University.

242. Preparation and approval of such syllabi by an affiliating University is not customary in most other countries. It has apparently certain advantages under Indian conditions and traditions. It has on the other hand certain distinct disadvantages. There is evidence that the syllabus tends to become static and does not keep pace with the advance of science and the progress of pertinent research. There may be a tendency in the case of the technical institutions unduly to limit the questions of the examination to those which are explicit in the syllabus. The inefficient teacher considers that his duty has been done when he has discussed and defined the terms of the syllabus; he may disregard important current findings of research which may be even more significant to the student and his immediate future than the subjects formally included. For example, a student in plant pathology may follow a syllabus in which no adequate attention is allotted to the very rapid current progress in a particular field. No teacher who is worth his salt should in his teaching confine his attention strictly to the outline of any syllabus. True, he should make sure, that the outline is adequately covered in his presentation, but he should assume that the syllabus is simply

the dry bones of the skeleton and that his course and his teaching should not be merely a course in syllabic osteology. The teacher must make from the skeleton a living thing, endowing it with flesh and senses and life. He must constantly relate the contents of the syllabus both to the cultural and vocational objectives of the student. He must be familiar with the latest developments in his subject, the lectures which he gives in one year should always show marked improvement over those of the preceding year. The successful teacher is one who is inspirational: he is the one to whose classes the students go with pleasure and recognise that they are not simply picking over the dry bones.

c. *Problem of the Curriculum*

243. Through the relationship to the preparation of the syllabi used by agricultural and veterinary colleges, the University also maintains complete control over the combination of the syllabi or papers into a curriculum. On the whole this has probably been desirable as it has aided these colleges to advance from sub-University to University standards.

244. There seems, however, to be at least one difficulty. Each University is the ultimate authority with reference to the requirements which it may lay down. There is, therefore, some divergence in the requirements for degrees from agricultural and veterinary colleges due to difference in their curricula as approved by several autonomous Universities. This problem is particularly evident in the standards maintained by the veterinary colleges, as is indicated in the section devoted to these institutions. Suggestions for greater standardisation of curricula and of procedures for the raising of educational standards in the veterinary colleges are also discussed there. Equally necessary is some greater degree of standardisation in the curricula of the agricultural colleges. However, the Team wishes to place on record that it is quite opposed to 'over-standardisation.' Agricultural colleges located in the several States of India must have certain differences in curricula ; it is better to relate them to their immediate environment. There should be reasonable compromise between the need for standardisation and the need for environmental adaptation.

245. Noted previously is the existence under the auspices of the Indian Council of Agricultural Research of a body known as the Indian Council of Agricultural Education. We believe that this Council should be recognised through its Standing Committee more fully than at present as the agency which should function to bring about any desirable and reasonable standardisation. One is ever *tempted* to suggest that this Council should be empowered to fix and enforce its findings and decisions, but agreements reached by common consent should prove more effective in the long run ; such has been the history in other countries, and there seems to be no *prima facie* reasons why the same should not be true in India. When substantial agreement has been reached as to standards by the Indian Council of Agricultural Education, there should be general acceptance of its findings by the several agricultural and veterinary institutions. Further more, it should be regarded as not within the province of any University to veto these recommendations. If for any reasons, a University believes that some serious blunder in educational policy has been made, the position should be reviewed by some appropriate body. The purpose of this is to make sure that the voice of the agricultural institutions should be paramount in matters relating to agricultural education. Such an arrangement should not interfere seriously with the maintenance of standards by

the University, which would retain its overall control of syllabi, quality of curricula, examinations and degrees.

d. *Problem of Authorisation of Post-graduate Students*

246. Post-graduate education in the agricultural and veterinary colleges is imperative. It is not adequately developed in India even for its present requirements. The need for the services for those qualified by post-graduate study will inevitably rapidly increase in the near future. The two Central institutions which are most adequately staffed to handle post-graduate work leading to the Master's and Doctor's degrees are the Indian Agricultural Research Institute at New Delhi and the Indian Veterinary Research Institute at Izatnagar. This statement should not be interpreted as meaning that there are not in India members of staffs of various agricultural colleges that are not fully the peers of the employees of these Central institutions. These Central institutes owe their importance in post-graduate work to the fact that the members of the staff have a high average of competence. There is a variety of significant problems under investigation; laboratories are on the whole much better equipped than elsewhere; the library facilities are much more adequate; and, in general, buildings and equipment are the best to be found in India. We have encountered some occasional feeling that the quality of work done at such institutions is necessarily of a higher standard than that done at the State and private institutions. This of course cannot be true. There are much better facilities for carrying forward specified types of agricultural research at many Central and State institutions, and there are also men fully qualified to direct the work of students in post-graduate studies.

247. Certainly the facilities of the other Central Agricultural Institutes as well as those administered by other agencies than the Ministry of Food and Agriculture as discussed previously, should be considered carefully by the Indian Council of Agricultural Education, and their several values in an overall scheme of post-graduate instruction co-ordinated. The Team believes that India has facilities and staff that are under-utilised in service to agricultural research and post-graduate education.

248. The Team has also been struck by the real potentialities on the part of some of the agricultural colleges for useful expansion in this field. At present many of the Indian students secure their M.Sc., Ph.D. and D.Sc. degrees in foreign institutions because of recognised specialisation in certain fields provided by these institutions. We feel that selected Indian institutions could be developed into strong centres of first-rate post-graduate instruction to fill this need. The country has already been divided into five regions for the purpose of inter-institutional agreements between Indian Agricultural Colleges and similar institutions abroad. The time is opportune for developing in each one of these regions a college providing up-to-date post-graduate teaching for the benefit of students from the region as a whole. Each college may eventually grow into a recognised institution for offering post-graduate instruction in selected fields peculiarly suited to that region. We suggest for consideration the following institutions to be developed into strong centres of post-graduate teaching in agriculture:

1. Indian Agricultural Research Institute, New Delhi,
2. Ludhiana Agricultural College, Punjab,
3. Agricultural College at Haringhatta, West Bengal,

4. Anand Agricultural Institute (or the Poona Agricultural College) Bombay State, and
5. Coimbatore Agriculture College, Madras State.

249. The Central Government should give adequate subsidy to these institutions for developing or augmenting existing facilities for first-class post-graduate instruction. Care should, however, be taken to see that provision is made for adequate staff, laboratories, equipment and standards of teaching. The institutions selected for such stimulation should have the completely integrated facilities of an adequate agricultural experiment station and have arrangements with suitable neighbouring agricultural villages for research in the social and economic sciences related to agriculture and for development of extension techniques. It should be Government's endeavour to enable such institutions eventually to develop into true Rural Universities of the type presently discussed.

250. Nothing said above should be regarded as prejudicial to the development of other agricultural colleges as post-graduate centres as funds, staff and facilities can be made available.

e. *Problem of Divided Jurisdiction—Government vs. Universities*

251. The Indo-American Team has found some evidence of friction as between representatives of the Department of Agriculture (or of Animal Husbandry) in certain States and the Universities concerning jurisdiction over agricultural and veterinary colleges. For example, opposition to the development of post-graduate work in a college under the jurisdiction of a State Department of Agriculture was expressed by a Departmental official. He insisted that the qualifications of those recognised as University Professors capable of directing the work of graduate students were placed in the hands of the Universities and that this was unwarranted interference with departmental control. In the opinion of the Team there must be acceptance of appropriate standards in the approval of those designated to handle post-graduate students to the Master's and Doctor's level. Membership of the staff of an Agricultural or Veterinary College by no means certifies the competence of the staff member to handle graduate students. The granting of higher degrees is a serious matter. Under the present conditions it would seem that the University should insist upon its prerogatives.

252. However, from the standpoint of appointments to positions such as those under consideration, the Indo-American Team believes that some careful study and reappraisal are in order. It may rightly be contended that too much emphasis is laid upon the possession of an advanced degree in the matter of selection of teachers for post-graduate teaching posts. The emphasis should be, we believe, rather upon the record and significant accomplishments and professional standing of the individual concerned. It may be assumed that in general by one highly desirable qualification for such a position is that the candidate himself shall have successfully carried out post-graduate work and possess an advanced degree but it should not be a *sine qua non*. This rule, if applied as the only criterion, permits the admission of misfits and occasionally prevents the recognition of an unusually competent individual. For example, in one Veterinary College we interviewed a staff member who could not be recognised on a University (Graduate) Faculty, it was said, because he had no advanced degree, although he had been a successful teacher for some years, was well and favourably known professionally for his activities in research, and had published competently in the

technical literature. This man had training ability and accomplishment much beyond the average individual possessing an advanced degree, yet he could not be considered for what would seem to be appropriate recognition. This carries degree worship to an unwarranted extent.

253. We would suggest that this problem, which is particularly acute in the colleges of agriculture and veterinary science, should receive the careful consideration of the Indian Council of Agricultural Education and, if possible, recommendations developed acceptable to the University which could be implemented without lowering the standards.

6. *Organisation and Problems of Rural Universities, Rural Institutes and Manjri type Schools*

254. The Report of the University Education Commission presents a striking statement of what the future Indian agricultural village should be:

> "Picture the kind of village life which should be aimed at. It must be economically prosperous. Its life must not be wasted in primitive habits of production. Full advantage should be taken of modern technical developments. Small scale farming by efficient methods will require only a small part of human labour needed at present, and production may be greatly increased. Much of the village population will be available for work other than agriculture. Each village, and especially each group of villages, will have a wide range of economic activity. A large part of the industry of the country should be located in villages and small towns. Every village should have a good year-round transportation, and should be supplied with electric power. Each one should have a piped water supply under pressure, a sewer system and a telephone system."

255. If the Indian agricultural village is to improve its level of living, there must be a diversion of its surplus and unemployed labour to industry. It is appropriate, therefore, that in a discussion primarily devoted to agriculture there should be occasional references to such diversion of surplus labour from the tilling of the land. The average land holding of the Indian farmer is insufficient even with greatly improved methods of cultivation, better seeds and better farm management, to bring an income sufficient for a desirable level of living. Evidently, industrial employment in the villages or in groups of villages must be developed sufficiently not only to absorb present unemployed and partially or insufficiently employed labour, but be sufficiently attractive to effect consolidation of holdings and reduction of labour needed to supply the needs for food and fire. In other countries the proportion of the population directly engaged in agriculture had decreased almost in direct proportion to increase in standards of living. Something more than a 100 years ago the proportion of the population in the United States engaged directly in agricultural production was about that which one finds in India at the present time, perhaps 75 to 80 per cent. At the present time 15 per cent of the population in the U.S.A. is engaged in agriculture with abundant production to meet all needs for better nutrition, clothing and housing than were available a 100 years ago.

256. In countries such as India where there is great population pressure upon the land, the tendency is to use as a criterion of efficiency of production the amount of crop that can be produced per acre. In countries with less pressure of population upon land, the tendency to determine agricultural efficiency is the amount

produced per hour of human labour. India is in the throes of changing from one concept of efficient production to another.

257. We have been struck also by another statement of the University Education Commission :

> "If these economic and hygienic advantages should be secured without corresponding development of character and culture, the change might be loss rather than gain. Economic, cultural and ethical education must go together."
>
> "The method outlined in its rudiments by Gandhiji is not just a way of meeting the educational needs of little children. He has stated the essential elements of a universal method of education, from the time a little child shares in its mother's work, through the whole process of growth of personality to the time when the mature man of disciplined mind and character works at the side of master in the achievement of a great design. The essence of this philosophy is that education should combine practice in the everyday processes of living and working, with more formal training. This is a fundamental concept which is steadily gaining support and application in the educational world."

258. The Team finds that there have been three related but somewhat different proposals for higher education to serve the Indian villager and particularly its farm people. These proposals are related in their objectives but differ in standards and scope. They should be considered *seriatim*. These three proposals are for:

(a) Rural Universities,

(b) Rural Institutes, and

(c) Vocational Agricultural Schools of the type developed in Bombay's so-called Manjri schools.

These are of course in addition to the present agricultural, veterinary and home science colleges.

a. *Rural Universities*

259. At several places in India visited by the Team much interest has been manifested in the development of 'Rural Universities'. The need for such institutions has been forcefully set forth by the University Education Commission under the Chairmanship of the eminent Indian scholar, Dr S. Radhakrishnan. In fact the carefully developed blue-print of such an institution has been primarily the work of this Commission. Our Team had been much impressed with the reasonableness of the proposals and the cogency of the arguments advanced for the authorisation and development of such institutions.

260. The Commission recommends that a Rural University should include 'a ring of small, resident, under-graduate colleges, with specialised and University facilities in the centre'. With this we would agree. The Commission also gives an interesting discussion of some of the problems that concern the Rural Universities:

> "Among professions or branches of professions in the development of which Rural Universities may well participate are various phases of water control engineering,

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soil improvement engineering, temperature control engineering, food processing technology, 'chemurgic engineering', ocean products technology, mineral processing, rural industrial counselling, rural public administration, rural social welfare, rural land and village planning, social engineering, rural sociology and anthropology, rural arts and rural medical service".

261. These are in addition to the areas which are more commonly considered to be related to agriculture, including agronomy, soil technology, plant breeding, rural home science, agricultural engineering, veterinary medicine, animal husbandry, horticulture, agricultural education, agricultural economics, farm planning and farm management.

262. For the complete development of a Rural University, we would envisage in the beginning the location on the same campus and in close juxtaposition a College of Agriculture and a College of Veterinary Science. Some of the subjects taught, such as animal husbandry, forage production, animal breeding, animal nutrition, and genetics are essential parts of the curricula both of the Colleges of Agriculture and of Veterinary medicine. The task of teaching these can be appropriately shared by the two institutions with resultant efficiency and economy. It is suggested further that in the initial development of such a Rural University the preparation for the Intermediate examination required for entrance to the veterinary college might well be given as a special two-year course in the Rural University itself. The Team is of the opinion that the formalised training in biological subjects, such as Botany and Zoology, could be much more advantageously handled in an agricultural college than in the conventional liberal arts institutions.

263. We would suggest further the addition, as soon as practicable, of a third college on the campus of the Rural University—a College of Home Science (or Home Economics). There are at present only two accredited colleges of home science in India. Neither of these is closely related to the need for training women for participation in direct raising of levels of living in Indian villages. We believe them to be doing excellent work in the training of teachers for the multi-purpose high schools and similar institutions which include home science as one of the subjects in their curricula. It is believed that colleges of home science should be developed as rapidly as possible for the training of those who can more actively and readily participate in the Community Development programmes at all levels. A part of the training in such institutions should be in agriculture, and the use of the facilities of the college of agriculture in such training would be highly advantageous. There should be provision here also for the training of teachers of home science for the village and secondary schools. The course should include a thorough grounding in nutrition, dietetics, child care and training, the elements of home nursing, rural arts, rural sociology and others.

264. A fourth addition to the constituent colleges of the Rural University should be a college of 'applied' liberal arts and science. This should not be the conventional college of liberal arts of which there are so many in India. It should be an institution giving an excellent basic training in the sciences and arts, *but with special emphasis upon their application.* This college should serve two principal purposes. It should take over the basic training required for certain subjects and their application to agriculture, veterinary medicine and home science. Here could be taught the basic courses in chemistry required of students in the other colleges, with adequate preparation for the continuation within such other colleges

of the more advanced phases such as soil chemistry, soil physics, biochemistry, animal and human nutrition. Here can also be taught the basic principles of genetics required for students in the other colleges, likewise the botany needed for agriculture, veterinary medicine, materia medica, etc. This college of liberal arts and science, in other words, will have as one of its functions a service relationship to the other colleges. Its location on a campus in which application of the sciences is particularly stressed should make possible the teaching of the arts and sciences in a much more realistic and functional form. The college should also have the independent function of giving specialised training in the underlying sciences, such as those necessary for producing many of the specialists enumerated by the Education Commission in the paragraph quoted previously. Here would be trained the agricultural statisticians, the food technologists, and those preparing for research in many advanced fields. Its students should have the opportunity to include in their curricula subjects taught in the other colleges.

265. We would also urge careful consideration of the inclusion in the Rural University in its final development of a college of technology, using this term in the broad sense of engineering and industries. The close relationship between the colleges of technology and engineering and the colleges of agriculture has apparently not been clearly recognised in India. The development of agriculture here as elsewhere is dependent upon a very close relationship between its engineers and agriculturists. There should be the opportunity within such a college for training in irrigation engineering with attendent opportunity for the students of agriculture to hear lectures on irrigation engineering at the village level. The development of village industries has many technical and engineering aspects. The whole field of agricultural engineering can be adequately developed, as it must be in India, only by close co-operation between technological and agricultural institutions. This has been the experience in other countries. For example, in the United States in practically every instance there is an engineering college on the same campus as the agricultural college.

266. There is no University in India at the present time which includes on a single campus a group of institutions such as those enumerated above, all related to village improvement. The Benares Hindu University closely approaches this pattern.

267. We believe that in the planning of the Rural University adequate attention should be paid to its facilities. It is axiomatic that a University is an institution emphasising not only higher education but research as well. In the long run, no college of agriculture, no veterinary college, no technical institution can do its job without adequate opportunities for research. There is in India decided tendency in many of the States to endeavour to differentiate these related functions too sharply. We have found in some cases that agricultural experiment stations and agricultural colleges occupying the same buildings and with an adjoining research farm but the two institutions quite unintegrated. The Principal of the college looks after the interests of the teaching faculty, but the men in the several divisions of research at the agricultural experiment station were directly responsible to the Director of Agriculture. The teaching schedules of the teachers in the colleges were said to be so heavy as completely to preclude any opportunity for research. Those on the research staff were either too busy or not inclined to participate in teaching activities. There is abundant experience in India and in other countries to warrant the statement that a college whose faculty is not actively interested in productive research is incomplete, and that

education in such institution cannot be at a level which will be demanded by the needs of India. We would urge, therefore, that in the development of a Rural University there should be sufficient land and research facilities for all of the constituent colleges. It is only in that sphere of scholarship and research that there could be adequate opportunity for post-graduate training.

268. One of the most important functions of the Rural University and its constituent colleges is to train men and women who can function efficiently in the Herculean task which India has set for herself—the material raising of standards of living of the rural population through the Community Development Programme. We may term this type of education as a preparation for community extension work. We quote the University Education Commission again:

> "*The Need for Agricultural Statesmanship*: Here we have one of the requirements of agricultural education. There should be men so saturated with first hand contact with Indian agriculture that they know it through and through in its most intimate make-up and elements. Then these same men should be so thoroughly familiar with agricultural policies and their workings, not in some one or two countries, but in every country which has developed sound judgment of relative values and appropriateness, not only of the leading overall agricultural policies of different countries, but also of their detailed elements."
>
> "India has many men who have the natural competence for a high quality of research. The type of preparation necessary for such services in defining agricultural policy is illustrated by Gandhiji. No man in India was more thoroughly and intimately acquaintd with our rural life, yet he saw it in relation to the whole life and destiny of India, and in some degree in relation to the life of the world."

269. In order adequately to train men and women in village extension work, the village itself should be constantly used as a laboratory for the students. In several instances in India we have noted with interest that an Indian village or a group of villages near the college or research station have been included in the larger campus. We would urge that such relationship to the villages surrounding the Rural University be created, and that students of all the colleges be expected to engage actively during their extension training in well supervised village community activities. While one would hope that the students entering a Rural University would come largely from the agricultural villages, one would not wish to exclude those who have had no village experience and background. Of course, the student relationship to the villagers would make sure of two things, that all students will be familiar with the problems of the village and that those students psychologically incapable of adjusting themselves to the rural point of view will be discouraged from continuing their work.

270. The preceding discussion makes it evident that a Rural University should have exactly the same autonomy as is accorded to other Universities. The degress which it may confer should have exactly the same standing and prestige as those conferred by other Universities.

271. The development of these Rural Universities, we believe, should be definitely encouraged by substantial grants-in-aid from the Centre, perhaps through funds channelled

through the Indian Council of Agricultural Research. It should be possible through the provision of such grants-in-aid to ensure greater security, autonomy and efficiency of these institutions.

272. We have noted in India several places where the stage is appropriately set for the organisation of Rural Universities of the type discussed. The State has available large tracts of suitable land for relocating agricultural colleges or veterinary colleges suffering from urban pressure. The time is opportune.

273. Personal observation by the Team has led to the conclusions that such Rural Universities could be appropriately established where old agricultural and veterinary colleges should be removed from their present locations or where new colleges are being established. We would recommend that immediate consideration be given to the establishment of Rural Universities in Uttar Pradesh (Tarai), West Bengal (Haringhatta) or alternatively Bihar (Patna), Orissa (Bhubneshwar), Travancore-Cochin (Trivandrum), and Bombay State (Anand).

274. It is suggested that the Indian Council of Agricultural Education should take such appropriate steps as may be advisable to implement the development of two or more Rural Universities where the present situation justifies, and to work with State officials and other agencies to develop recommendations to be directed through proper channels for Central assistance in the development of such significance in India.

b. *Rural Institutes*

275. A second new proposal for advanced training significant for the rural economy of India is given in the Report of the Commission on Higher Education of the Ministry of Education (1955). It recommended that there be established a series of so-called Rural Institutes. This Committee had the following terms of reference included in its directives:

> "to undertake a comprehensive survey and appraisal of promising ideas, institutions and experiments in the field of higher education in rural areas; to determine what specific projects and institutions should be encouraged to carry on experimental work in this field; to recommend a possible pattern for Rural Universities with particular reference to the aims, organisation and content of higher education in rural areas; its relationship to basic and secondary education and other allied problems and to suggest ways and means of making education in the existing Universities more useful and more closely related to rural needs and problems."

276. The Committee rephrased its terms of reference as a directive to make:

> " a comprehensive survey of the existing institutions and experiments in the field of higher education in rural areas and then secure for recommendation for a suitable pattern which could meet the requirements of rural India."

277. The Committee paid little attention to the pattern proposed by the University Education Commission for the formation of Rural Universities. It recommended rather the use of the term 'Rural Institutes' for an analogous institution with a somewhat different series of objectives. Specifically they recommended:

> " the establishment of Rural Institutes or institutions of higher learning which

> could give to the rural youth that training and skill which would make them effective leaders of the community."

and further—

> " At least one Rural Institute should be established in each State as soon as there is a competent staff available to run it. The ultimate aim must be at least one Rural Institute in every division."

The Rural Institutes should be properly constituted to—.

> " help in breaking down economic and geographic barriers between the rural and the urban population. They will also help in bridging the gulf which exists in our country between culture and work ; between the humanities and technology and between the practical and the ideal."

278. Rural Institutes are planned to accept students who have completed their post-basic or higher secondary education and wish to proceed for higher studies. We understand that this means that the prospective student must have completed the eleven forms of primary, middle and higher secondary school work.

279. Students with several objectives are to be admitted and six types of curricula are recommended :

(1) A three-year diploma course in Rural Services,
(2) A one-year course in addition to the above for Teaching Diploma,
(3) A one-year course for a Teaching Certificate,
(4) A two-year certificate course for Rural Health Workers (Women),
(5) A two-year certificate course for Overseers, and
(6) A two-year certificate course in agricultural science.

280. Provision will also be made for shorter certificate curricula in such subjects as rural hygiene, agriculture and rural engineering. Shorter courses would be provided for those " who wish to increase their knowledge and skill without having to go through a regular course. " It is intended that the Rural Institutes should include teaching, research and extension. The Team suggests that the comprehensiveness of this programme has not been adequately envisaged by the Committee. The Rural Institutes will endeavour to meet the educational needs of everyone in the area they are to serve, indeed functioning ' as a cultural and training centre and as a centre for development planning for the entire community. ' It is noted that ' the requirements for recruitment to Government services will need adjustment to afford the products of Rural Institutes their rightful place in the administrative services. ' " The Institute will be residential for students of both sexes and for staff, with adequate amenities for living rooms, class-rooms, workshop, farm, etc."

281. Noteworthy is the statement that " Rural Institutes will take every aspect of the region or village as their field of research, and with a view to action. " A considerable number of fields for research in the Institutes are outlined, including eleven in the field of economics, eight in hygiene, five in education, four in sociology.

282. All students would undertake some useful work on the campus, needy students would be provided with paid jobs as far as possible related to their major objectives.

Considerable programmes of 'Short Courses' are to be instituted for the education of non-student members of the community.

283. The diploma is to be awarded by the National Council of Higher Education for Rural Areas and will be called the National Diploma in Rural Services. Noteworthy are the following statements concerning examinations:

> "We are convinced that if the Rural Institutes are to succeed in their mission every care will have to be taken to see that the students and teachers at these institutes are not subject to the tyrannical influence of the traditional type of examinations."
>
> "A definite shift in emphasis away from the stereotyped written examinations and towards depending for assessment on cumulative records of practical and social activities of the students will be essential for the success of the Rural Institutes."

284. At the Central level it is recommended that "a National Council of Higher Education for Rural Areas should be established as an advisory body to the Central Ministry of Education."

285. Likewise, "at the State level there should be established State Councils of Higher Education for Rural Areas in the Departments of Education along the same lines as suggested for the Centre."

286. Of particular interest is the recommendation that "each Rural Institute should have a governing body to determine major policy to facilitate the general understanding and support of its programme, and to ensure academic and financial integrity in all phases of the Institute's work." The report is vague with reference to the composition of this governing body, which would apparently function much as a Board of Regents.

287. As to the internal organisation of the Institute, it is proposed that there should be a Director responsible to the Governing Body, a librarian and heads of six major departments (Agriculture, Engineering, Hygiene, Rural Services, Teacher Training and General Studies). It is also proposed that there should be an Extension Service department directed by a head responsible to the Director to co-ordinate the field work of the educational departments and to promote the total Extension Service programme of the Institute.

288. Each Institute would require a capital investment of Rs. 65 lakhs and a recurring budget of Rs. 5.5 lakhs. As the source of revenue for Rural Institutes it is suggested that the major cost of capital development and one-fourth of the recurring operating cost be borne by the Centre. It is suggested that the State should share in the cost of capital development and pay two-thirds of the operating costs, with perhaps some aid from the Community Projects Administration. Students should pay the full cost of their living expenses and up to one-fourth of their educational cost, much of which might be covered by services performed by them. Finally, it is recommended that the scheme be implemented by the immediate selection by the Government of five or six existing institutions already doing pioneering work in this field.

289. The Team was highly impressed by the pains taken by the authors of the Report on Higher Education, to provide a blue-print of an institution to suit the requirements of rural people in their own environments. Nevertheless, the Team believes that this institution is a half-way house between the Rural Universities envisaged in the University Education Commission's Report and the Manjri type of vocational agricultural schools. It is our view that the Rural University and the Manjri type of vocational school are distinct and have separate functions to perform. The one is intended to provide University education with emphasis on agricultural education, research and teaching which could not be provided in an institution below University standard. Similarly, the vocational type schools cater to the needs of village youths who could not afford the costly and time-consuming University education. Any institution which, for economy or other reasons, attempts a midway between these two institutions is not likely to provide instruction intended for the two distinct needs which could be met by Rural Universities or the vocational schools of the Manjri type we have dealt with in this report. We feel that the good features mentioned in the report on the Rural Institutes can well be incorporated into the existing agricultural colleges, some of which could eventually be developed into Rural Universities on the lines recommended by us. In fact, some of them have already been so incorporated in a few agricultural colleges. The Team would, however, like to sound a note of caution that the setting up of Rural Institute without realising that they are neither Rural Universities nor vocational Manjri type schools would not fulfill the high ideals envisaged in the report of the Committee on Rural Education.

c. *Vocational Agricultural Schools—Manjri Type*

290. The Team finds that there exists in India a keen interest in the development of institutions which might well be equivalent to the European Volkschule. The Manjri type of institution has for its entrance requirements a certain amount of formal elementary and secondary education, but not Matriculation. The Manjri Schools apparently had their inception in the Bombay State where a number of them are in successful operation; some have been started in a few other States also.

291. The Planning Commission has already recommended the establishment of agricultural schools of this type. It is intended eventually to set up one in each of the 310 Districts in India. Of these, it is hoped that 150 schools may be established during the period of Second Five-Year Plan.

292. These schools are intended to impart the type of education best adapted to the needs of the agricultural population of the rural areas. Training in these schools is essentially of a practical nature in order to enable the young farmer to develop his skill and acquire a balanced and progressive outlook. Apart from the training in the science and practice of agriculture, these agricultural schools should also function as centres of specialised training in soil conservation with assistance from the Central Soil Conservation Board.

293. The courses of study will extend over a period of two years and include subjects deemed specially necessary for the local youths who intend to remain on the farm. The subjects prescribed would include agriculture, animal husbandry, dairying, animal diseases,

horticulture, co-operation, agricultural marketing, agrarian legislation, village industries, civics, and methods of agricultural extension. Probably some other subjects should be included, such as public health, village administration and revenue, soil conservation, forestry and management of grasslands. The certificate acquired upon the completion of the course of study should testify to the increased ability of the student to manage and operate a farm and should also make him eligible for admission to certain Government jobs such as the post of Land Recorder, *i.e.* a *Talati* or a *Patwari* in the village. He should, in other words, be in a position to develop eventually as a village leader.

294. For the sake of uniformity and ease in administration the number of agricultural students in each of these schools is to be limited to 100, *i.e.*, 50 in each entering class. A farm of 150 acres adequately irrigated should be attached to the school. The labour on the farm is to be done by the students themselves under the supervision of agricultural officers and 'some experienced fieldmen and gardeners.' An attempt will be made to combine instruction with practical farm operations. The students will do all the farm work, 'clean byres, make compost, tend animals without the assistance of any farm labour.' A simple hostel adequate but suited to the village surroundings is to be provided. The students will eat in a common mess and will help in cooking their meals. Food as far as available will be provided from the farm at cost. In compensation for the labour performed, each student will receive monthly a stipend of Rs. 25. In order to reduce the net recurring annual cost of these schools various schemes are proposed for increasing the income from the farm. For example, a seed farm may be developed at each school to serve the seed requirements of a Community Project or some development blocks. A fruit nursery for producing plants for new orchards, a poultry farm which will sell higher grade poultry to the villagers and similar special enterprises are contemplated. Various agricultural services should centre in the institution.

295. The non-recurring expenditure for a Manjri type school including land and buildings, livestock and equipment is estimated at Rs. 3,00,000. The net recurring expenditure annually is estimated at about Rs. 30,000. After five years of operation, the net annual recurring expenditure may be considerably reduced.

296. The proposal for the establishment of 150 agricultural (Manjri type) schools for inclusion in the Second Five-Year Plan is well developed. The suggested syllabus is based on that already in use in the Bombay State with the understanding that it will be adapted to the region in which the school is located. The syllabus seems to be well worked out and a student who has completed the course of study should be well equipped to handle his own farm and to act as a leader in co-operative village enterprises of many kinds.

297. The Team regards this experiment in rural education as being decidedly worthwhile under Indian conditions.

298. It is specifically recommended that a special search be made in all Manjri schools for particularly promising or brilliant students who may be given the opportunity to proceed with their education at a still higher level in the agricultural and veterinary

colleges of India. The Manjri type schools should not prove to be a dead-end street for the really talented youth.

299. The anticipated rise in the economic level and in the standards of living in the villages in time will bring necessarily some changes in emphasis in the Manjri type schools. In other words, they should continually be adjusted to their improving environment.

300. In summary, the Team believes that wherever practicable, each Indian State should proceed towards the development of a Rural University within each State and a Manjri type school in each District.

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IV. AGRICULTURAL ADVISORY SERVICES

COMPREHENSIVE and well-considered definition for extension or advisory tained in the report on extension of the meeting of the F.A.O. held in as follows:

> Extension or advisory services and other allied services have the following indispensable functions for instructing farm people in agriculture and domestic science and in agricultural affairs ; bringing them the latest results of research in these fields, on quality and cost as well as on the quantity of production, and teaching them improved techniques of farming and rural living ; calling the attention of research institutions to the agricultural and home problems that require study ; and providing opportunities for farm people to meet together for the purpose of learning from each other and developing leadership in agricultural affairs ".

02. India with 360 million people of whom 82.5 per cent reside in 500,000 villages, remendous task in extending information to rural people, and providing the other hanges outlined above.

303. Prior to 1952, the efforts of the Government to improve the levels of living in areas were directed through the various Development Departments, including iculture, Animal Husbandry, Health, Education, etc. These Departments worked dependently and with varying success in carrying the desired information and improvenent practices to the villages.

304. The Grow More Food Enquiry Committee which reported to the Government of India in June, 1952, after examining the economic problems of village people in great detail, concluded that all aspects of rural life were so inter-related that no lasting results could be achieved if individual problems were dealt with in isolation. In recognition of this the Government of India established the multi-purpose programme of extension and advisory services, now widely recognised as the National Extension Service-Community Projects movement.

305. The First Five-Year Plan for 1951-56, placed the highest priority on agricultural development and initiated programmes to arouse the enthusiasm of village people for new knowledge, and to inspire them with the will to live a better life.

A. *National Extension Service—Community Projects Administration*

306. The responsibilities for the general administration and co-ordination of the National Extension Service movement are vested in the Community Projects Administration. This organisation provides the central guidance and co-ordination for the functions or working plans in the different subject-matter fields developed in co-operation with the various Welfare Departments or Ministries at the Centre.

307. The Community Development programme was inaugurated in 55 p
throughout India on October 2, 1952. More projects were launched in 195
are currently 220 development blocks covering about 23,650 villages with
of 21.5 millions.

308. In order to provide for the expansion of the multi-purpose extensi
to a larger number of rural people, in response to popular demand, the
India decided early in 1953 to initiate the National Extension Service. Th
somewhat diluted programme with essentially the same general obje
Community Projects. This additional programme provides for the inclusio
of 120,000 villages, or about one-fourth of the rural population, within the p
First Five-Year Plan.

309. It is expected that the National Extension Service will be a permanent org
tion. It provides the basic organisation and minimum financial support for develo
projects. Added support will be provided through the Central Government's assi
to States for different types of development, and by corresponding allotments by the
for various projects.

310. The total programme for the First Five-Year Plan period provided f
blocks under the National Extension Service. Of these, 700 blocks, consisting of about
villages with a population of 40 millions, were to receive attention under the inte
development programme of the Community Projects. The remaining 500 blocks, inclu
about 50,000 villages with a population of 35 millions, came under the less intensive
gramme of the National Extension Service. It is expected that by the end of the Sec
Five-Year Plan period the entire country will be covered by the National Extension Servi
This will operate through 5,000 National Extension Service Blocks, each having abo
100 villages and an average population of about 66,000 people per Block.

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B. *Ministry of Food and Agriculture*

311. The function of the Ministry of Food and Agriculture in the N.E.S.-C.P.A. programme is limited essentially to that of training. The Agricultural Extension Commissioner in the Ministry of Food and Agriculture, Government of India, has the responsibility for the general supervision and co-ordination of the training of the village level workers or *Gram Sevaks.* These individuals are the multi-purpose extension workers at the village level, each with a responsibility for 10 villages.

312. For each Block in the National Extension Service programme 10 village level workers will be required, above whom will be four supervisors or subject-matter officers for (1) agriculture, (2) animal husbandry and veterinary science, (3) rural engineering, and (4) co-operatives. Forty-four training centres have been established co-operatively by the Centre and the States. The programme of each centre includes one year of training in agriculture, and six months in extension methods. In 25 of the training centres a home science section is being included. A special training programme has been initiated under which 25 girls from India were selected for training in Hawaii and Japan and on their return were assigned extension training responsibilities for home science.

C. *State Organisation*

313. In each State there is a Development Committee consisting of the Chief Minister and the Ministers in charge of the Development Departments, charged with laying down the general policies for the implementation of the National Extension Service programme. The Development Commissioner in the State is the Secretary of this Committee and serves as the co-ordinating leader of the team consisting of the heads of Departments or the Secretaries to Government in the various Development Departments. The Development Commissioner is not the head of an independent Development Department, but is essentially a co-ordinating agent to insure that the work of the different Departments proceeds along the lines contemplated in the total plan.

314. The general co-ordination responsibilities at the District, sub-Divisional and Block levels, similar to those of the Development Commissioners at the State level, have been assigned to the Collector, Sub-Divisional Officer and the Block Development Officer, respectively.

315. The technical officers or specialists belonging to the different Development Departments are, therefore, subject to the co-ordinating supervision of the general administration officer of the appropriate level, including the Block Development Officer at the Block level, the Sub-Divisional Officer at the Sub-Division level and the District Officer at the District level. The multi-purpose village level workers or *Gram Sevaks* are under the District administration, but receive guidance in technical matters from the respective technical officers at the various levels.

316. The rapid expansion of the National Extension Service—Community Project Administration programme has presented a number of problems in recruitment and training of adequate staff. Some difficulties have been encountered in providing for a suitable co-ordination of the activities of the various Development Departments and in managing effective liaison between the research stations, the technical staff members of the Extension Service operating at the Block levels, and the village level workers.

317. A primary difficulty in this liaison problem appears to rest on the supervisory relations with the subject-matter officers at the Block level. These officers are deputed from their parent Departments of Agriculture, Animal Husbandry, Co-operation and Engineering. Although the respective Departments are expected to be directly responsible for the administration of the technical personnel falling within their scope, and for execution of the plan at the field level, there has been some tendency for formation of a separate 'Development Department' that is inclined to exercise control over all personnel from the Project or Block level down to the village level. This has served to isolate the subject-matter officers from their parent Departments.

318. In spite of the above and other problems that are to be expected in a rapidly expanded programme of such magnitude, the National Extension Service—Community Projects scheme has been received enthusiastically by rural people and has made substantial contributions to improving their level of living.

D. *Recommendations for Improvement of Agricultural Advisory Services*

319. There is considerable difference of opinion in the country regarding the desirability of having a single agency such as the N.E.S.-C.P.A. organisation responsible for the extension of information in specialised fields, such as agriculture, health, etc. Some individuals feel strongly that the separate welfare departments should administer their own educational or extension activities directly. Others point out the merits of a co-ordinated, multi-purpose approach. There are good justifications for both these views.

320. The fact remains that at this time the pattern of extension in India has been set as a multi-purpose programme. This pattern has been agreed upon at high Government levels. The programme is functioning and in most cases is functioning effectively. It is well received by those people whom it is designed to serve. The problems in organisation and functioning of the programme appear to be well recognised by the Government of India officials and are reviewed frequently to determine what corrective action should be taken.

321. The recommendations of the Team with regard to technical advisory services relating to agriculture, have been developed, therefore, in recognition of the existing pattern of multi-purpose extension in India.

1. *Functions of the Ministry of Food and Agriculture*

322. At the present time the responsibility of the Ministry of Food and Agriculture for extension work is limited primarily to the support and co-ordination of extension training centres. This work till recently had been handled by the I.C.A.R. which is charged with the responsibility for co-ordinating agricultural education. It is now administered by a separate Directorate of Extension and Training under the Ministry. As the extension training is of an *ad hoc* nature and below the college level education, there should be no objection to a separate organisation handling this work. But the country should look to the agriculture and home science colleges for future extension and home science workers and the responsibility for developing such training in those institutions should devolve on the I.C.A.R. and the Indian Council of Agricultural Education. It is to be hoped that when the colleges turn out graduates fully trained in extension work, it may be possible to eliminate the *ad hoc* training now being given.

323. If the extension activities relating to agriculture are to be continued as an integral part of the multi-purpose scheme of a permanent National Extension Service, the primary responsibility for utilising up-to-date technical information should rest with the N.E.S. staff. It should be the responsibility of this organisation to see that their recommendations are based upon the best current findings of the Central and State research institutions. It should be their responsibility also to see that they do not recommend the use of improved crop varieties if stocks of seed of such varieties are not available, or the use of specific fertiliser materials when supplies of such fertilisers are not to be had. The extension organisation is not serving its function or acting intelligently if it recommends techniques that are impracticable, or the use of materials that are not available.

324. The responsibility of the Central Ministry of Food and Agriculture should be to provide adequate liaison between the I.C.A.R., as the technical arm of the Ministry,

and the N.E.S.-C.P.A. organisation at the Central level. This liaison relationship has been provided in the recommendations of the Team, with responsibility to be handled by the Chief of Advisory and Information Services in the I.C.A.R. The technical or subject-matter specialist staff of this office should be developed on a basis that would provide for adequate liaison relations at the Central level. The other technical staff members or Commissioners in the I.C.A.R. would, of course, be expected to co-operate in the provision of the practical information in their respective fields.

2. *Advisory Services at the State level*

325. At the State level, the organisation will depend, to a large extent, upon the recognition of responsibility within the State for the extension activities. Under the plan now in operation in most cases at the State level, the implementation of the agricultural extension activities is handled by the Department of Agriculture and the other welfare departments concerned, and co-ordinated by the Development Secretary or Development Commissioner.

326. Where this arrangement can be made to function satisfactorily, it would seem desirable for the responsibility at the State level to be placed under a Joint Director of Agriculture for extension activities, who would have direct charge of the agricultural extension work through the N.E.S.-C.P.A. programme. It would be necessary for the Joint Director for Extension and the Joint Director for Research and Education at the State level to work closely to ensure the proper liaison relationship.

327. The provision of technical advisory specialists as members of the staff of the colleges or research institutions would insure for the necessary liaison and contact by such subject-matter extension specialists as might be employed on the staff of the Joint Director for Extension. The foregoing would seem to be a satisfactory and workable plan, although it is appreciated that the circumstances in certain States might require some modifications. The Team recognises that such modifications depend upon local conditions with which the Team is not fully conversant and, therefore, it does not seem feasible to suggest further variations of the above recommended procedures.

3. *Ensuring Research Attention to Practical Problems*

328. Concern has been expressed at the Central and State levels regarding procedures whereby research workers can be continuously informed about the problems of the cultivators that require practical solution. The various Advisory Committees under the I.C.A.R. and the Ministry of Food and Agriculture provide for such attention at the Central level. Additional measures should be established at the State level. As a formalised procedure, a meeting could be held annually, or six-monthly if necessary, at which time the senior research staff, agricultural advisory staff, and the subject-matter extension specialists could discuss the practical problems requiring research attention, the extent to which the existing knowledge can meet such needs, and the desirability of initiating new research on such problems.

329. A second important procedure for ensuring effective contact between the research worker and the people on the land is through 'open house' or field-day programmes, held either at the Central Institute stations, the State experimental stations or

sub-stations, and demonstration plots, at appropriate times through the season. Such meetings will provide an opportunity for the research worker to maintain contact with the practical problems of the rural people and will also encourage cultivators to make more frequent use of contacts and advice of the research stations designed to serve them.

4. *Provision of Technical Advisory Services to Agricultural Interests on Storage, Marketing and Related Fields*

330. At the present time there does not appear to be effective provision for advisory services to the agricultural marketing, storage, and related programmes. Part of the difficulty stems from the fact that there is relatively little research under way on storage and marketing problems. The provision of the position of Chief of Advisory and Information Services in the I.C.A.R. should furnish the necessary contact at the Central level for those organisations interested in obtaining such information as may be available for the guidance of programmes of storage, marketing, or related agricultural fields. Similarly, the technical advisory specialists associated with the colleges and research stations at the State level should provide ample contact in the States for transmitting such information.

5. *Publications for Extension Use*

331. The development of suitable publications for the transmission of practical information to cultivators and village level workers should be the responsibility of the I.C.A.R. at the Centre and the State Departments of Agriculture and the Colleges of Agriculture in the States. Suitable information units should be developed in these agencies for the production of such material based on approved results of research. The material produced should, however, be directly related to the current needs in the Project areas and the N.E.S. blocks, and the subjects for such material should be determined in periodic consultation with the agencies in charge of N.E.S. and Community Projects work.

332. The format or manner of presentation should be developed co-operatively by the Chief of Advisory and Information Services of the I.C.A.R., and the N.E.S. staff. Costs for such publications should be borne by the C.P.A. or the N.E.S. so long as this programme is not a constituent part of the Ministry of Food and Agriculture.

333. At the State level provision also can be made for a suitable relationship between the extension staff and the appropriate Information Officers or technical advisory specialists at the colleges or the experiment stations.

V. RELATION OF RESEARCH AND EDUCATION TO SERVICE AND REGULATORY ACTIVITIES

334. PROGRESS in agricultural improvement can frequently be facilitated by providing special services for the farmer or villager, which he cannot provide for himself under certain conditions. In a Welfare State, such as India, provision for various services has perhaps been carried further than in most other nations. These services are not primarily research or educational. They are generally designed to provide immediate monetary returns to the farmer or to give him specific information for improvement of practices.

A. *Agricultural Services*

335. In some cases, a direct service is provided to the villager by veterinarians and stockmen who treat and vaccinate his animals and advise with regard to animal nutrition. The State maintains improved breeding stock, particularly improved bulls, and there is an increasing provision of artificial insemination services in the breeding of improved cattle. Provision is made for supplying pure seeds of improved varieties of plants. The cultivator may secure improved plants from Government nurseries at a reduced price. He is provided with supplies of fertilisers from Government agencies on a deferred payment basis. He may secure domestic fowls of improved strains from Government production centres. Provision is made by the Government for short-term and long-term loans to finance agricultural operations. These and many other services are provided in the agricultural economy of India.

336. Certain types of services are rendered by specific agencies, such as the veterinary dispensaries or the extension staff of the N.E.S.—C.P.A. In some cases, these functions are conducted by the research agencies. For example, the Indian Veterinary Research Institute has been entrusted with the production and distribution of improved poultry under the Poultry Development Plan.

337. It is important that these services should be recognised for what they are and that they should not be confused with research, education or extension. Funds designated for research, education or extension should not be devoted to administrative and other overhead costs involved in the provision of the types of services indicated above. A research station which has developed a productive new variety of wheat or other crop which is in great demand should not have its research funds diverted to the production and distribution of seeds of that variety. Similarly, the scientific staff should not be expected to devote their time and energy to the task of supervising the production of increased seed supplies. This point is emphasized because of the frequent tendency of the layman and administrative officers to confuse such services with research or educational functions.

338. At the present time, a casual observer might believe that the funds of the Indian Veterinary Research Institute were all applied to research. As a matter of fact, a portion of the Institute's programme is devoted to the production of anti-sera and vaccines for distribution and use as an agricultural service, and to the production and distribution of

improved poultry. It should be recognised that funds expended for such services are not research funds, in that they are not developing new information to solve the problems of Indian agriculture. To this extent it is reasonable to assume that the real support for research in the country at the present time may be somewhat over-estimated.

B. *Administrative or Regulatory Programmes*

339. Certain types of programmes may be initiated for adjustment of agricultural developments, utilising techniques other than education, research or extension services. These may take the form of legal requirements imposed upon farmers, such as quarantines or other restrictions, requiring the use of police power by the Centre or States. In some cases it may be found advisable directly to subsidise the farmer by cash payments provided he carries forward certain desirable practices to prevent soil deterioration, or to increase or decrease acreage of specific crops to meet production demands.

340. The work of the Central Tractor Organisation of the Ministry of Food and Agriculture, which since 1947 has reclaimed jungle or *kans*-infested land to the extent of 12.7 lakh acres, is another example of an action-type programme, that is not research or educational. These action programmes, like the service activities, should not be confused with extension or research. There is evidence that such confusion is not uncommon and steps should be taken to provide for special support and staff for handling such activities in order to prevent application of excessive time and energy by research, education and extension staff, to the detriment of these important activities. An extension worker who is called upon to apply or enforce control or regulatory measures usually finds his working relations with the farmers changed because of his ‘police’ activities. This reduces the effectiveness of his office in transmitting information and other functions of an extension nature.

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VI. ADMINISTRATION AND PERSONNEL MANAGEMENT

341. SOME of the major difficulties in the way of developing improved technical leadership in the fields of agricultural research, education and related advisory services are due to current policies of administration and personnel management. Considerable attention has been given to the development of improved agricultural facilities, including colleges and research laboratories, in recent years. There is some indication that the enthusiasm for developing improved physical facilities has been accompanied by a lack of adequate foresight in providing for the type of scientific and teaching staff that is essential if the new facilities are to function effectively.

342. The quantity and quality of research or teaching that can be expected from the improved facilities will be almost directly dependent upon the quantity and quality of the staff available. As one leading Indian educationist has recognised 'bricks, stones and mortar do not make a University.'

343. The problems relating to professional agriculturists and their administration in India are numerous and complex. They must be analysed carefully and definite steps taken to improve the position of agricultural scientists and educationists if technology in agriculture in the country is to progress.

A. *Qualifications of Directors of Agriculture and other Key Administrative Officers*

344. The direction or supervision of research or educational programmes in agriculture, as in any other field, must be entrusted to individuals who have a full understanding of the problems, requirements and potentialities in these technical fields. The head of a research institution must be a stimulating, driving force capable of perceiving the nature of complex problems, determining the feasibility of the various research approaches, and must fully understand that research in many instances must be slow, laborious and, in numerous instances, unproductive. Such proper technical leadership will lend stability and provide for continuous progress in research. The same general qualities are required in the education and extension fields. There is a tendency in some States or institutions to place non-technical administrative officers in charge of agricultural research, education and other technical services. This is a move toward mediocrity in technology. It is recognised that individuals who have had the varied experience provided by the practice of shifting from one administrative post to another of continuously higher responsibility do acquire a broad background experience that is valuable in enabling them to meet many diverse and complex administrative problems. They become extremely competent in making decisions on broad administrative matters. Progress in the technical fields of agriculture, however, requires more than ability to iron out administrative wrinkles. It requires the leadership of career professional agriculturists rather than career professional general administrators.

345. The Team had the occasion to contact a number of State Directors of Agriculture who were non-technical men. There was no question about the general competence

or ability of these individuals. It was evident, however, that in many instances their knowledge of the deep-seated problems of agriculture was largely superficial and they could not provide the leadership or understanding necessary for the handling of the important technical matters in agriculture. Considerable time of their subordinate technical workers was occupied in educating the non-technical administrative superiors, who then made the final important decisions. An equally important detrimental factor is the potential long-term effect on scientists whose efforts and ambitions will be shackled by such non-respected, non-technical leadership.

346. Science and education are the creative and productive forces for India's agriculture. They must be provided with the highest calibre of technical guidance available in the country. This relates to the key positions of supervision not only in the research and educational institutions, but also in the positions of State Directors of Agriculture, since these positions have immediate responsibilities for research and education in agriculture at the State level.

B. *Training of Professional Agriculturists*

347. It has been interesting to observe that in a country whose economy is predominantly based upon agriculture, those individuals trained in agriculture are excluded from the Indian Administrative Service. This appears to be due in part to the inadequate breadth of training in the colleges of agriculture. It is apparently due in part also to the current refusal of the Government to recognise agriculture as one of the qualifying subjects relating to the competitive examinations for entry into the Administrative Service.

348. It does not appear sound to perpetuate a system which excludes trained agriculturists from posts of responsibility in administering the many Governmental activities that must necessarily involve agriculture in a country such as India. There is no reason to believe that an individual with a B.A. degree in literature, history or philosophy, or with a B.Sc. degree in physics, chemistry or mathematics is basically more competent to make decisions that relate to agricultural technology or other highly specialised fields than an individual trained to the same level in agriculture.

349. Steps must be taken to provide for training of agriculturists that will permit their entry into the Administrative Service and insure their availability for positions of leadership in highly specialised agricultural fields.

C. *Promotion Policies*

350. One of the most important obstacles in the development of a high grade technical agricultural service in India is the current system of promotion. Advancement in scientific ranks is based almost entirely on seniority. In general, once an individual enters the public service and acquires a permanent position in a scientific field, he can count upon gradual advancement if (*a*) he retains good health and (*b*) avoids the type of miscounduct, mis-demeanour or other actions that would result in his expulsion from the Government service. In practice, there is essentially no recognition of merit or productivity.

351. Several of the administrative leaders in agriculture at the State level in India have expressed their dissatisfaction with the tendency of some Indian agricultural scientists 'to stay in their laboratories and to refuse to dirty their hands in the field work outside.' These administrative leaders pointed out that agricultural scientists in other countries were more inclined to work with their hands and do much of their own planting, note-taking and other work relating to their scientific fields.

352. Several young Indian scientists have independently pointed out the real fundamental basis for this situation. They say that invariably the young man who returns from abroad after receiving a post-graduate degree or a high level of training in the agricultural science is enthusiastic about the prospect of making real contributions to Indian agricultural research. He recognises the extremely fruitful potentialities for making a contribution in his home country. During his first year or so, he tends to do much of his own field or laboratory work. Before long, however, he is brought to realise that his advancement depends very little upon his individual initiative or contribution to scientific progress. He has almost equal opportunity to advance if he assumes a desk position of scientific direction and permits the labouring staff available to him to lay out the experiments and bring back the data for his observation.

353. Provision must be made for the periodic evaluation of the competence and productivity of research workers, as a primary basis for promotion. Such evaluation has been provided for in many countries, and should also be possible in India. As a means of evaluation, committees have been established in the respective scientific disciplines, composed of well qualified individuals who are usually medium to high ranking scientists, respected by their associates in the particular field of work. These committees assume a responsibility for evaluating and rating the competence and productivity of their scientific associates, as a guide in determining promotions or advancements. Such evaluation provides for the recognition of merit and should be given greater weight than seniority in the selection of individuals for key posts. Scientific personnel committees of this type should be established in each State and in the I.C.A.R.

354. In addition to scientific attainment, other qualifications must be weighed in selecting individuals for certain high positions. On several occasions, the Team has been advised that it has not been possible to co-ordinate the efforts of specific research institutions because of 'personality conflicts' between the heads of the institutions. The ability of scientists to work with others and their willingness to mediate differences in viewpoints are essential qualities that should be considered in promoting men to positions of leadership in research or education fields. Again, reliance solely on seniority aggravates problems of co-ordination and co-operation because often such senior individuals are strong-willed, inflexible, and unwilling to modify their views on questions which can best be compromised.

355. Another major problem in the advancement of scientists is the transfer of specialists trained in a certain discipline to high level positions in another scientific field for which they are not especially qualified, but to which they are considered entitled on the basis of seniority. The Team was advised of an individual trained in paleontology who took a position as a teacher of plant pathology, immediately following his advanced training, since this was the only post available at that time. After more than ten years in this

post he obtained a position as a research specialist on sugarcane. Although he had no previous research experience, and no significant knowledge of sugarcane breeding and production practices, he was appointed to this position because of his seniority rights to the post. After several years in this position he was transferred to a post as an 'expert' in the breeding and improvement of cotton, wheat, barley and paddy. Eventually paddy was eliminated and he is currently an expert on wheat, barley and potato breeding. It was stated that this individual would have preferred continuing in the teaching profession but had no opportunity to advance financially to a reasonable level without transferring to another field of work.

356. In a second instance, a scientist has been working for more than ten years on the breeding and improvement of oilseeds and pulses. His experience includes work with 26 different crops, all requiring specialised knowledge of their genetics and breeding behaviour in the improvement research programme. The head of this research section has recently taken another post. Instead of advancing the well-qualified existing staff member, the Team was advised that another man from outside of the section was being brought in 'because he was a senior individual.' The net result will be that India will lose the competence and background of experience that has been developed through the many years of efforts of the scientist working in oilseeds and pulses since that man will eventually seek a position outside of his section to which his seniority will, in turn, entitle him.

357. On numerous occasions, the Team heard Indian scientists and administrators in agriculture express the wish that India had more agricultural scientists of international reputation and recognition. This recognition is desirable, but will never be achieved so long as the competent scientists and potential leaders in the respective fields are constantly side-tracked because less qualified senior men are shoved into the supervisory positions.

358. In order to diminish the tendency of shifting scientists from one field to another for which they are not basically qualified, categories should be established within which scientists can advance. The number of these categories will depend to some extent upon the number of scientists working in the respective fields. As a minimum, the categories should include such fields as plant breeding and genetics, plant pathology, plant physiology, agronomy, soil science, agricultural engineering, animal breeding, dairy husbandry and other similar disciplines. The background of experience and productivity in a given field of research also should be weighed, in addition to seniority, in determining the qualifications for filling a vacant post.

359. A further deficiency in the promotion scheme is the provision in many instances that a certain proportion, for example 50 per cent, of the vacancies in an organisation are to be filled by promotion and the balance by recruitment. This is not a sound principle to follow in staffing scientific programmes. It is recognised that opportunity should be provided for entry of new individuals into the scientific field. But this entry should be on the basis of qualifications and merit. The failure to promote a well qualified and deserving individual already on the staff, and to place over him a less qualified individual brought in from the outside, merely to satisfy a formula, is demoralising and detrimental to any research organisation.

360. There is little provision at the present time for the heads of institutions or organisations to assume any reasonable degree of responsibility in the selection of personnel for key scientific, teaching or other technical posts. It is recognised that such selection has been placed in the hands of the Public Service Commission, primarily to prevent individual bias or favouritism in selecting from among many available individuals for the limited number of vacancies that occur. More attention should be given to the development of suitable evaluation procedures through the medium of the Public Service Commission. These Commission members are usually not scientists and lack a full appreciation of the qualities that are needed in filling specific scientific posts. Many of the principal requiremens for a scientific post cannot be recorded adequately on paper and similarly it is impossible to spell out the various personal qualities or weaknesses that might render a given individual unfit for a particular position.

361. In the development of co-operative, co-ordinated research in India more attention must be given to the combined attributes of technical competence, leadership qualities that command the respect of associates, the willingness to work effectively as a member of a co-operative team, and other qualities that are equally intangible but directly related to the success or failure of a co-operative technical programme.

362. The only sound solution to this problem of selection of scientific personnel is to place a major responsibility for such selection on the head of the organisation or agency in which the individual is to be employed. To prevent excessive abuse or personal bias, a committee made up of the senior technical personnel in the institution could be established for advisory purposes. The recommendations of the head of the agency, with the concurrence of this committee, should be given primary consideration by the Public Service Commission in the filling of scientific posts. This would provide maximum assurance that the individual selected for a position of leadership in the organisation would be respected and well received by his associates as well as being well qualified technically.

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D. *Delegation of Authority*

363. The efficient management of any organisation requires a reasonable assignment of recognised authority to the various administrative or organisational levels. Such delegation of responsibility is lacking in a number of research and educational institutions visited by the Team.

364. In some institutions the head of the organisation or section made a special effort to introduce the subordinate staff members and give them an opportunity to present their respective programmes. In other institutions the head of the organisation did not give recognition to the subordinate staff. In some institutions visited by the Team, it is appreciated that the latter situation resulted from a desire by the head of the organisation to utilise the limited time available to the utmost advantage. In other cases, it was clearly evident that the subordinate staff was normally given little voice or recognition in the planning or conduct of the work of their respective units.

365. On a number of occasions the administrative and technical officials concerned with Indian institutions indicated that certain adjustments in organisation or the initiation of new programmes could not be undertaken because of lack of competent leaders. This

may be the situation that exists, but it must be recognised that the basic qualities of leadership in individuals must be nurtured and given an opportunity for expression and development. There are a large number of individuals, including younger men, in India who have the same potential qualities of leadership that are found and recognised in other countries of the world. India will not lack in technical and professional leadership in agriculture if these individuals are given a reasonable opportunity to develop experience, confidence and competence through the assignment of increasing responsibilities.

366. In addition to developing a larger staff of potential leadership, greater delegation of responsibility is needed in order to expedite the handling of the numerous questions and decisions by professional or administrative leaders. The addition of subordinate staff members does no good in speeding up the handling of work if such additional staff members represent merely more desks over which papers pass before they finally reach the top supervisor or administrative official who insists on personally handling all details.

367. There appears to be a definite reluctance on the part of some heads of organisations to delegate responsibilities, because they feel that such relinquishing of authority on their part will result in a deterioration of their position in the eyes of their subordinates. The Director of an institute need not lose his recognised position of authority if he delegates to a head clerk the responsibility for handling routine matters and items of lesser importance. His position of leadership should not necessarily be dependent upon complete control of all minute details.

368. The time and energy of technical or professional personnel in agriculture could be utilised more effectively in many instances if they were provided with adequate competent clerks or assistants to handle routine matters that need not receive the attention of the Director. In several institutions it was pointed out that the head of the college or laboratory was forced to sign vouchers or papers authorising the payment of bills for only a few annas. It is recognised that this situation rests upon Governmental regulations holding the Directors or individuals in similar key posts responsible for all financial matters. The present system does not permit of the maximum return from the real qualities and competence of technical people. Provision should be made whereby many of the non-technical items could be made the responsibility of clerical or administrative people.

369. The failure to delegate adequate responsibility to heads of the various organisations or units for purchase of supplies and equipment results in considerable inefficiency through delay in procurement of items essential for the conduct of research or teaching activities. Under the present system the head of an organisation is usually not free to implement a scheme even after it has been approved by the appropriate committee or unit of a Ministry and the proposal has been granted funds, for example, as an I.C.A.R. scheme. There is an excessive requirement for further justification to acquire sanction or approval of the Finance Officers to obtain funds for the scheme or sanction to the purchase of special items, including scientific equipment.

370. In more than one instance the Team was advised of situations wherein subordinate officers in the administrative heirarchy had noted on the files that they were not convinced that a certain specialised item of research or teaching equipment was essential.

The head of the laboratory or college found it necessary in such cases constantly to intercede at the various levels, to justify through correspondence or in person the acquisition of the specialised equipment needed to carry on an already approved research scheme. This procedure not only results in excessive effort and time being expended by those not qualified to evaluate the need for technical facilities or equipment, but also results in delays in getting work under way. In some instances, the delay has resulted in the lapse of funds since the programme could not be started within the year for which the funds were approved.

371. There should be a reasonable delegation of authority to the heads of organisations for the pruchase of supplies or equipment up to a value of Rs. 2,000/- without additional sanction or approval by the Finance Officers. This would eliminate many of the minor bottlenecks which frequently are as significant as major ones in curtailing effectiveness of research or teaching programmes.

E. *Salary Levels*

372. Perhaps no single problem of personnel management was mentioned more frequently in the discussions with the professional agricultural officers than was salary. The impact of inadequate salary exerts an influence in many ways. While it is recognised that the financial resources of India are limited and salaries must be adjusted accordingly, the present inequities in the salary levels of professional employees in agriculture, as related to similar positions of responsibility or productivity elsewhere in the Government, are basic limiting factors in the development of an effective programme for improving agricultural technology in the country. As was mentioned previously, funds have been provided in considerable abundance for construction of buildings and facilities, but almost no attention has been given to the financial support of the professional staff that is essential in making such facilities productive.

373. The disparity between salaries of scientists or teachers in agriculture and administrative positions is unrealistic and results in a down-grading of scientific stature in India. Research and education are creative forces that provide new wealth for the country both through the development of material goods and the enrichment of an enlightened population. The ablest minds trained in India's colleges and Universities should be channelled into this highly productive technical research and education activity. This does not happen in the present circumstances wherein the greatest opportunities for personal welfare lie in the acquisition of a position in the Government Administrative Service. A disproportionate share of India's intellectual competence is thus decanted off into the administrative field. While such services are important, it is unfortunate that the difference in salary and financial opportunity is such that many of those who might be more interested in following a scientific or technical professional career are lost to this field.

374. The consideration of adequate grades or salaries for scientific and professional positions in agriculture should be reviewed through all levels of the pay scales. At the present time individuals who have received post-graduate training and advanced degrees

at the M.Sc. or Ph.D. level have little opportunity to find positions in agricultural science or teaching in India that will provide a level of pay that is reasonable and in line with their training and qualifications. It has been pointed out that a Matriculate who joins the Calcutta Police Force to serve as a traffic officer draws more salary than can be expected by an individual who, after Matriculation, spends several years and considerable money in obtaining training of an M.Sc. or Ph.D. degree level to fit himself for scientific or educational work.

375. India has lost many potentially productive, well-trained young scientists because of the failure to recognise their value in terms of salary and related opportunities. This situation is well recognised in India, as indicated by the Development Minister of one important State, who stated that he had advised certain students who had received advanced training in foreign Universities to the M.Sc. or Ph.D. level, to stay in the foreign country or seek jobs elsewhere because of the limited pay and professional opportunities in India.

376. Under conditions wherein India needs and should have available all of the trained scientific and technical personnel possible, it is not realistic to maintain salaries at levels that encourage competent Indian scientists to go elsewhere for employment in their specialised fields. It is recognised that salaries are reviewed periodically by a special Government Commission. An early review by this Commission is essential to ensure salary adjustments that will attract and hold scientific personnel if agriculture in India is to progress.

F. *Staffing Patterns*

377. Mention has previously been made of the relationship between the heads of sections in the colleges or research institutions and junior staff members. In many such institutions there is need for development of a staffing pattern that will provide for more high level positions in the respective sections or units.

378. In one research section visited, the Team was advised that of the 147 employees, the staff included one Class I officer and six Class II officers; the balance of the staff consisted of helpers and labourers. This is not a sound staffing pattern since research contributions are made by trained minds and not by 'hands.'

379. Research units cannot produce substantial results if they are staffed by one high level scientist, with a number of substantially lower level supporting helpers. The problems confronting agriculture are of such magnitude and complexity that within a specific field, such as entomology or plant pathology, well trained individuals should be available to assume full delegated responsibility for the research on each major insect or disease problem. It should be remembered that the loss from diseases or insects, or the benefits to be derived from substantial improvements through animal breeding and nutrition are of such magnitude in the agricultural economy of India that they deserve attention by well trained competent scientists. India cannot afford to risk its future

technological advancements because of an unwillingness to employ and support scientists of the calibre required effectively to solve complex agricultural problems.

G. *Retirement Policies*

380. The productivity and contributions of highly trained or skilled professional workers, including agricultural scientists and educators, are usually maintained at a high level for many years. The benefit of experience usually enhances the productivity of scientific and educational personnel. In view of the critical shortage of technical specialists in agriculture every effort should be made to retain those individuals who are well qualified, in good health, and willing to continue in active service, beyond the current retirement age of 55. It is recognised that provision is now made for extending the period of service of such individuals but such extensions are usually limited to a period of one year and, frequently, decisions are not reached with sufficient promptness to permit the individual to plan his future residence or activities.

381. Procedures should be developed whereby decisions could be reached regarding the continued employment of an individual substantially in advance of the date of his proposed retirement. Also, if it is decided to grant an extension of service, such extensions should be granted for a period of two or three years to ensure maximum contributions by the employee. An individual who is granted a short-term extension of service for six months or one year, is relatively ineffective because he usually spends excessive time in speculating about his future employment or in making plans for his impending retirement.

382. The Ministry of Health has recently taken action to extend the retirement age of medical personnel to 60 years. The following statement from 'Hindustan Times' of September 25, 1955, elucidates the action taken:

> "An announcement made the other day in Parliament by the Health Minister relating to the age of retirement has raised an issue of all-India importance. She has announced that so far as medical personnel are concerned, they will be allowed to continue in service until the age of 60. Presumably this applies only to those serving under the Central Government, but as it is obviously unfair to have one rule for the Centre and another for the States, it may be expected that the States also will adopt a similar rule. If the reason for the special concession shown to medical men is the shortage of doctors in the country—particularly in view of the vast requirements of the Second Five-Year Plan—this reason applies equally strongly to many other classes of scientific and technical workers. There is a shortage practically in every field where trained talent is necessary. It would be well, therefore, if the Government considered the question of the age of retirement from a wider standpoint. At present extension of service or re-employment after retirement are being allowed in special cases in nearly all Departments, but it is the favoured official, not always the deserving, who gets the benefit. A general raising of the age of retirement, in respect of all scientific and technical services, may be desirable

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> at least as a temporary measure. It should be noted also that much of the present shortage of doctors, engineers and other professional and technical men is due to lack of proper organisation in recruitment and lack also of a clear idea of the material already available in the country. Otherwise one cannot explain the spectacle of a large number of trained men still unemployed on the one hand and complaints of staff shortage on the other."

The Team endorses fully the above statement and urges that a similar decision be taken with regard to technical personnel in agriculture.

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VII. PROFESSIONAL SOCIETIES AND FARM ORGANISATIONS

383. ONE of the principal stabilizing influences in technical fields is the free interchange of viewpoints between scientific workers. Similarly, the guidance of scientific efforts on problems of practical importance is achieved in a large measure through the constructive criticisms and recommendations of the people on the land. It is higly desirable that provision be made for self-expression and interchange of ideas among scientists. It is equally important that organisations be fostered that will permit cultivators to present their viewpoints in an organised and constructive manner for the guidance of the various agricultural programmes.

A. *Scientific and Professional Societies*

384. Professional or scientific societies have not been developed for certain major fields of agriculture, or are poorly organised and supported in India at the present time. There are a few exceptions, and it is noted that an Entomological Society, Botanical Society, Indian Phytopathological Society, Home Science Association, and other Societies have been organised. The Indian Science Congress provides an opportunity for fostering scientific interchange, but agricultural scientists in general lack an opportunity to participate in meetings where they can benefit from the experience and viewpoints of their associates.

385. It has been suggested that one of the reasons for the lack of development of scientific or professional societies in agriculture is that the majority of those working in these fields are Government employees at either the Centre or State level.

386. The lack of availability of funds for travel and incidental expenses required for attendance at scientific meetings appears to be a principal handicap. The individual scientist finds it difficult to defray the cost of travel and living expenses out of his own pocket, for the several days of attendance at a scientific meeting.

387. Attention should be given to the strengthening or activation of professional societies related to agriculture, to provide an opportunity for scientists to meet at least once a year to exchange information and ideas of a professional nature. This could be accomplished in veterinary science, for example, by reactivating the Indian Veterinary Medical Council and by organising District and State Veterinary Medical Associations. Similarly, consideration should be given to the establishment of an Indian Society of Agricultural Science, to include sections related to the major specific scientific disciplines. The meetings of such societies could be held in different parts of India in different years so that a large number of scientists would have an opportunity to attend such meetings at least once in two or three years with a minimum of travel cost.

388. The Central and State Governments should adopt a more liberal policy in providing funds for travel to permit attendance of scientists at the National and also International Scientific meetings.

B. *Farm Organisations*

389. The development of the multi-purpose programme for improving the levels of living of rural people in India envisages a substantial contribution by the village people themselves in implementing many of the phases of village improvement. In the brochure 'Road to Welfare State,' is the following paragraph:

> "A substantial part of the development necessarily falls on the shoulders of the villagers themselves. Villagers must take initiative to decide what they need most, and in what order. They have to gird their loins and get down to the ground with the axe and the shovel, and start the multi-purpose development on their own, individually, collectively and in groups. Government agencies will be there to act as complements to the people, obeying their behests in every phase of the activities and at every stage of the programme."

390. The participation of the people in the planning and guidance of activities to improve their own welfare is a primary characteristic of a democratic State. The Government that exists to serve its people must foster the development of procedures or organisations through which the needs and desires of its people can be forwarded in a systematic, intelligent, and constructive manner.

391. In a country as predominantly agricultural as India, it is essential that the people on the land be provided with every opportunity to express their views and indicate their major requirements. This function is assumed in most countries by farmers' associations, such as the Farmers' Union of Great Britain, Landwirstchaft Kammer in Germany and several organisations in the United States, including the American Farm Bureau Federation, the Farmers' Union, the National Association of Farm Co-operatives and the National Association of Soil Conservation Districts.

392. India has inaugurated such a movement through the formation of the Farmers' Forum. This organisation and similar associations of farmers might well play a major role in the future development of Indian agriculture. Such associations should be encouraged and assisted, wherever possible, to ensure the development of the type of organisation that truly represents and speaks for the rural people. A sound organisation of this kind can exert a tremendous constructive influence in shaping the educational, scientific and other programmes or policies relating to agriculture.

VIII. SUMMARY OF PRINCIPAL RECOMMENDATIONS

Research

1. The funds of the I.C.A.R. should be utilised to initiate work in fields that are not now receiving attention or to strengthen research in fields where current support is inadequate.

2. A percentage of the annual income of the Central Commodity Committees should be credited to a fund controlled and administered by the I.C.A.R., for support of numerous cross-commodity projects including crop rotation and soil management, home science, farm management and economics and similar studies which would permit of a better balanced programme of research in India.

3. The I.C.A.R. and the Central Commodity Committee should, instead of making cash contributions, supply both trained personnel and operating funds for research in co-operation with the States.

4. The I.C.A.R. should maintain a Central cadre of scientific personnel of the rank of Class II services and above for use in regional schemes both by the Council and the Central Commodity Committees. The Central Commodity Committees should utilise such permanent staff and should not recruit research staff independently without first having definite assurance that scientific personnel would not be available from the I.C.A.R. cadre.

5. The scientific staff in the I.C.A.R. cadre, who render approved service, should be made permanent in the cadre and be assured of avenues of promotion in the different research schemes sponsored by the I.C.A.R. and the Commodity Committees.

6. The funds of the I.C.A.R. should be applied to the employment of scientific staff to serve as project co-ordinators in conducting field reviews of regional or national schemes involving co-operation of the Central and the State Governments. Such co-ordinators should be active research workers in charge of studies that are a constituent part of the projects of which they serve as co-ordinators.

7. In order to provide a more adequate level of research for the country, the Central Government should appropriate an additional Rs. 2 crores each year to increase the total research funds at the end of five years by a total amount of Rs. 10 crores. These new additional funds should be allotted directly to the States as long-term, continuing grants distributed on the basis of proportion of the population.

8. The funds granted directly to the States should be available for use on any significant problem requiring research attention in the agriculture of the State as determined by the individuals in the State responsible for research, and related technical programmes.

9. Administration and control of these grant funds by the Central Government should be limited to (1) the maintenance of a record of projects to which these funds are assigned by the States, (2) a brief report to be submitted by the States annually summarising use of

the funds and progress of the research, and (3) an annual field review by selected staff members of the I.C.A.R. to observe the work in the field and discuss the research work with the appropriate State officials.

10. In addition to the continuous grants from the Centre mentioned above, attention should be given to building up of research facilities and programmes in the currently less well-developed States. Provision should be made in the Second Five-Year Plan for improving the research capacity of such States through Central grants to cover 75 per cent of the capital expense and loans for the remaining 25 per cent, with full provision by the Central Government for recurring operating expenses for the five-year period. This should be in addition to the long-term Central grants-in-aid.

11. The States should provide such additional support as may be desirable to meet significant problems of local or State-wide importance.

12. The States should develop adequate research facilities to permit their participation in schemes of regional or national significance wherein personnel employed by the I.C.A.R. could be located in the problem areas where research is to be conducted.

13. The Central and State Governments should review co-operatively, through the Advisory Board of the I.C.A.R., the projects currently supported by the I.C.A.R. and/or the Central Commodity Committee funds to determine which schemes should be continued through the I.C.A.R. or the Commodity Committee funds, which should be taken over by the States either through the use of State funds or the new Central grant funds, and which should be discontinued.

14. At the end of five years, when the full increments of Central grant funds to the States have been provided, a careful evaluation should be made by the I.C.A.R. Advisory Board to determine the quantum of future research support. Appropriate recommendations should be made to the Government of India through the Governing Body of the I.C.A.R. relative to further Central support and to the respective State officials relative to further State support.

15. Provision should be made for an organisation with adequate staff of high technical competence at the Centre to serve effectively as the technical arm of the Ministry of Food and Agriculture. This should be achieved through the continuation of the I.C.A.R. as this body, with modifications in functions and staffing to permit the I.C.A.R. to function more effectively.

16. The Minister of Food and Agriculture, Government of India, should continue to be the President of the I.C.A.R. The Governing Body, the Advisory Board, the Standing Committee, and the Standing Finance Committee, together with their functions, should be retained.

17. The Chief Executive Officer of the Council and Agricultural Adviser to the Central Government should continue to have the position of Additional Secretary in the Ministry of Food and Agriculture. This officer should have the title of Executive President of the Council rather than the current title of Vice-President which does not adequately reflect

the stature of leadership that the executive head of the Indian Council of Agricultural Research carries.

18. To assist the Executive President on technical questions a senior technical officer should be appointed to be designated as Deputy Executive President. This officer should have maximum delegated responsibility for the planning of regional or national programmes, for developing and maintaining a balanced approach to the many research problem fields, for co-ordinating the research, educational, information and other scientific functions of the Council and for maintaining relations with the States in co-operative schemes.

19. For the handling of administrative, financial and business management affairs the Executive President should be assisted by a Senior Secretary, who should be an experienced officer in administration having not less than four years' service as Deputy Secretary to the Government of India. He should have delegated responsibility for the handling and execution of most of the administrative affairs of the Council to permit the Executive President to devote major time to technical questions and decisions. There should also be a Secretary of Deputy Secretary status to ensure the expeditious handling of the numerous administrative affairs of the I.C.A.R.

20. A technical staff of high competence, including individuals responsible for each major problem field, should be established in the Council and should serve together with such other officers as are essential on the Board of Research. They would be responsible, under the co-ordinating leadership of the Deputy Executive President, for continuous analysis of the broad research needs on problems of regional or national significance in the country as well as for constant review of the research in their respective fields.

21. In addition there should be 'end-use' Advisers of the Ministry of Food and Agriculture and the I.C.A.R., on a regional basis, to ensure that the Central subsidy given for a large number of developmental schemes under the Second Five-Year Plan are utilised for the intended purposes, according to schedules and targets laid down, and to iron out bottlenecks.

22. The I.C.A.R. should develop and maintain a complete file of research projects relating to agriculture, including projects supported by the Central and the States Governments and other organisations. The staff in the unit responsible for developing and maintaining these files should serve in visiting the States at least annually to consult with the appropriate State officials regarding the use of funds and progress in the projects supported by the Central grants.

23. The Chief of Advisory and Information Services in the I.C.A.R. should serve as the principal liaison officer between the I.C.A.R. and the organisations responsible for extension or related development programmes.

24. The Chief of Advisory and Information Services should assume the responsibility, in co-operation with the respective Commissioners and Chief Scientists, for assembling an annual report to be submitted by the Executive President of the Council to the Governing Body and to the Minister of Food and Agriculture. This report should summarise and point out critical problems confronting agriculture that need future research attention.

25. One of the principal functions of the Centre should be the provision of special facilities and staff for research on problems of regional or national concern. The Central Institutes which have been established or will be established in the future should be considered as the executive arms of the I.C.A.R. and should function as the operating side of the Council. This position should be clearly recognised if the work of these institutions is to be co-ordinated effectively and brought into close partnership with the research conducted in the States.

26. The Central Institutes and the I.C.A.R. should be brought into closer working relationship by having the Central Institutes deal directly with the Council or through the Council on all technical and administrative matters relating to the schemes supported by the I.C.A.R. It would be highly desirable to require the I.C.A.R. to review, for co-ordinating purposes, all research conducted by the Central Institutes.

27. The development of national or regional centres should be limited to those problem fields and to areas of work in which Centrally supported institutions can function more effectively than individual State research institutions in providing research or testing services required by a number of States. The Central Institutes should not normally establish branch stations but rather should work in co-operation with the State stations to ensure maximum Centre-State co-ordination of research.

28. Members of the staff of the Central Institutes should be designated as the project co-ordinators, particularly for those commodity fields where Central Institutes exist. Salary and travel funds should be provided by the I.C.A.R. and provision should be made for adequate subordinate staff to permit the work of the project co-ordinator to be continued without disruption during his absence from the station in travel to the co-operating State research stations.

29. Procedures should be developed for the review, planning and budgetting of the programmes of the I.C.A.R. and the Commodity Committees on a biennial basis. Problems of regional or national importance, such as should be supported by the I.C.A.R. and the Commodity Committee funds, are of a long-term nature and a thorough consideration every two years should be adequate. This will reduce the costs for travel and the time now involved in annual committee reviews.

30. The responsibility for supervision and co-ordination of research and education at the State level should be assigned to a Joint Director of Agriculture who, in most cases, should be the Principal of the dominant Government Agricultural College in the State. This individual should be a well qualified technical man with a background of training and experience in research.

31. A staff of technical advisers should be developed in the States to be located in close association with the colleges of agriculture or the research stations, under the Joint Director of Agriculture for Research and Education. These individuals should be in constant touch with research under way to expedite transmission of new information to extension workers and serve as principal liaison officers in keeping scientists informed of practical problems requiring further research attention.

32. The States should provide adequate sub-stations or field experiment stations representative of the different environmental conditions of the States to evaluate new techniques, crop varieties, fertiliser practices, or other improvements to ensure localised acceptability before such improvements are offered to the farmers.

33. The States should participate fully with the Centre in the development of research of regional concern. Provision is made for this through the Advisory Board of the I.C.A.R. and the development of technical committees covering specific problem fields under the executive leadership of the project co-ordinators.

34. In developing co-operative Centre-State research on regional or national problems the States should endeavour to provide laboratory and field facilities wherever possible. The State contribution to such co-operative programmes should primarily be in terms of facilities for research including land and labour.

35. The contribution of the Centre for co-operative research on regional or national problems should largely be in terms of qualified technical personnel to be employed by the I.C.A.R. and deputed to the States wherever the problem exists. Provision of equipment, supplies, local travel and other costs could be jointly shared, or borne by either the State or Centre as mutually agreed to.

36. In order to ensure the maintenance of desirable co-operative working relationships a memorandum of understanding that would include a brief description of the contributions by the Centre and the States and joint contributions should be developed. This memorandum would include understandings covering broad working relationships, questions of publication, period and control of seed stock or other material products of research.

Higher Education in Agriculture, Veterinary Science and Related Fields

37. The Team recommends that the Government of India give serious consideration to establishing a post-graduate college of agricultural sciences at the Indian Agricultural Research Institute, New Delhi, leading to the M. Sc., Ph.D. and D.Sc. degrees, with affiliation to an appropriate University.

38. The Team also recommends the establishment of a post-graduate college at the Indian Veterinary Research Institute, Izatnagar, offering post-graduate training leading to the M.Sc, Ph.D. and D.Sc. degrees, and that a portion of the students admitted to the college be specifically trained for entering the educational field in the colleges of veterinary science and animal husbandry in the several States upon completion of the course of study. This, in the opinion of the Team, should have a great influence in raising the standards of teachers and of education in the State colleges of veterinary science and animal husbandry.

39. The establishment of this academic college for post-graduate training at the I.V.R.I. should be done with very deliberate and careful planning from all aspects, including administration, staffing, academic and research instruction, financing and co-ordination with the existing facilities and personnel at the Indian Veterinary Research Institute.

40. It is suggested that when such post-graduate colleges are set up certain personnel of the I.A.R.I. and the I.V.R.I. should be joint staff members with these teaching institutions.

41. It is recommended that the excellent facilities available at the Indian Dairy Research Institute, the Central Rice Research Institute, the Central Potato Research Institute and the Jute Agricultural Research Institute for post-graduate research work on dairying, rice, potato and jute be co-operatively utilised with agricultural teaching institutions in the vicinity for providing post-graduate training in these subjects and awarding post-graduate degrees by affiliation to appropriate Universities.

42. It would be of advantage to the country if agricultural colleges and institutions providing post-graduate teaching and located in close proximity to some of the recently established National Laboratories on fields having significance in agriculture, develop close working relations so that post-graduate students in agriculture can make use of the facilities in special, but related, fields in such Laboratories.

43. The agricultural colleges will have to take up in the immediate future the role of training graduates for extension work. Most of the agricultural colleges, however, do not offer specialised courses in agricultural education or extension methods, or provide facilities for laboratory work in the villages. Such facilities and the requisite additions to curricula should be developed to permit of needed under-graduate specialisation.

44. All the agricultural colleges giving courses leading to the higher degrees — M.Sc., Ph.D. and D.Sc.—should have suitable farm, library, laboratory and other facilities for carrying on research.

45. No agricultural college should undertake post-graduate instruction unless the members of the faculty engaged in such institution are themselves carrying on significant research. The Principals of such colleges should be chosen with due regard to their qualifications both in teaching and research. When practicable, these Principals should also be appointed as Joint Directors of Research.

46. While there could be no objection to the Agricultural and Veterinary Institutions being subjected to close supervision by the Directors of Agriculture or Veterinary Services, we would like to see the Principals given more freedom of action in the internal administration of the colleges.

47. More particularly, the Principal of a college should be regarded as the authority having the fullest responsibility over the internal administration relating to teaching.

Organisation and Problems of Professional Veterinary Education

48. In order that veterinary and animal husbandry education may be improved and the profession attain a higher degree of efficiency in India, the Team recommends the following:

The colleges possessing teaching faculties that are not up to the standard from an academic viewpoint should make every effort to upgrade those faculties through:

(*i*) providing opportunity for advanced or post-graduate training to as many of its members as possible each year by sending them abroad or to the Indian Veterinary Research Institute. On the basis of the present teaching staff in the 14 colleges of veterinary science and animal husbandry in India it appears that about 10 per cent could be selected annually for post-graduate training without unduly upsetting the teaching programme;

(*ii*) introducing within the college research opportunities for the teaching staff which will tend to develop them through self-study and endeavour;

(*iii*) providing special training conferences for teaching staff members in the various areas at selected institutions during the summer vacation period. For example, a college of veterinary science and animal husbandry having an especially strong department of Physiology should be selected to conduct an intensive three or four weeks training course which staff members in the departments of Physiology at other colleges would be invited to attend. The specialists conducting these courses might well be chosen from amongst Indian veterinary educationists and/or specialists in the field from other countries. It would be reasonable to assume that several such specialised teaching conferences for lecture and laboratory demonstration could be held each year in the several disciplines, such as Anatomy, Physiology, Pharmacy and Materia Medica, Bacteriology and Pathology, Surgery, Genetics, Nutrition, Medicine and so forth. It should also be reasonable to expect that the State or Central Government provide the needed funds for such conferences and would compensate teachers selected for organising the conferences.

49. Until the present emergency is over (India's great need for veterinarians in its expanded agricultural programme), the Faculty personnel of each college should be augmented on the order of one Faculty member to 15 or 20 students—this, the Team recognises, will be very difficult because of lack of trained personnel in the country.

50. The curricula of the veterinary colleges should be overhauled by a Committee of highly qualified veterinary educationists, such as the Sub-Committee of the Indian Council of Agricultural Education. This Committee should prepare and recommend the minimum essentials of a well balanced curriculum, and this educational requirement which, after approval of the Veterinary Council, should be adopted and put into practice by the several State Colleges of Veterinary Science and Animal Husbandry.

51. The Team does not wish this recommendation to be misconstrued as favouring complete standardisation of curricula, because it recognises that the curricula and syllabi should not be firmly fixed but should remain as flexible as possible to meet the needs of different geographical areas. The course of study, however, should provide for minimum requirements of training in all fields in order to prepare the students to take responsible positions in India's agricultural expansion programme.

52. The syllabi, the text books used and the present teaching methods should be carefully studied and altered, where advisable, by the Committee indicated above, to recognise the rapidly expanding knowledge in the various fields of veterinary science and animal husbandry.

53. The present University examination system should be overhauled drastically. In any event, teachers should be held responsible for periodic examination of their students and the college examination marks should be used, at least in part, in determining the fitness of the students to receive a degree.

54. The teaching 'load' of the Faculty should be reduced and its members charged with carrying forward some significant research in their respective fields, such as bacteriology and pathology, animal physiology and genetics, and animal nutrition. This would accomplish a two-fold purpose:

- (*a*) It would contribute greatly to rounding off a teacher's education and improving the quality of his teaching. It would create the environment needed for post-graduate training at the University level;
- (*b*) Research discoveries that are bound to come from such activities would aid materially the solution of the many livestock and poultry problems of India, particularly on a regional environmental basis.

55. The present large number of students in the Colleges of Veterinary Science and Animal Husbandry should be reduced as soon as the emergency is over to a number that would be consistent with the ability of the college to provide high quality and adequate professional training. This will materially assist in elevating the standards of education and provide continuing supply of well trained veterinarians to India.

56. The State Government should provide adequate finances to meet the college's needs, programmes, buildings, faculty, class-rooms, laboratory and research equipment.

57. The Team recommends that the Government of India give financial assistance to a few colleges of veterinary science and animal husbandry on a regional basis that would immediately enable these colleges of specific regions to establish post-graduate training in the several appropriate fields leading to the degrees of M.Sc. and Ph.D., and to staff and equip research laboratories for the investigation of animal and poultry diseases, and animal and poultry nutrition, genetics and breeding. The Principals of colleges giving post-graduate training should be selected with due regard to their background of experience in both teaching and research. When a Veterinary Research Institute is established as part of or adjacent to a Veterinary College, the Principal of the college should also be the head of the Institute, preferably with the title of Joint Director. The research resources of the institute should be available to the post-graduate students. The State receiving such Central assistance would be expected to accept students from the other States within the region and to conduct research on problems pertaining to the region. In implementing this recommendation the Government of India should appoint a Committee of veterinary specialists to determine the number of additional staff needed at the institutions and the additional facilities needed in the way of buildings, equipment, etc. Since an academic post-graduate college has been planned for the Indian Veterinary Research Institute, this college could well serve as one of the regional post-graduate and research institutions.

58. When new Colleges of Agriculture or of Veterinary Science and Animal Husbandry are to be established, and when old colleges of either category are to be relocated, they should be placed adjacent to each other on the same campus or be located on a teaching

University campus. This arrangement would mutually benefit the students of both colleges by providing joint use of facilities and staff.

59. The Team is cognisant of the proposed relocation of the College of Agriculture and the College of Veterinary Science and Animal Husbandry at Hyderabad. If these colleges are to be moved, we would recommend that they be located adjacent to each other with some sharing of facilities, particularly those relating to animal husbandry.

60. Greater emphasis should be placed upon the teaching of animal husbandry in both the Colleges of Veterinary Science and the Colleges of Agriculture. This subject has too long been neglected by the colleges and a rapid development of greater knowledge in animal nutrition, animal genetics and breeding is of *imperative importance* to the economy of the livestock industry in the nation.

61. Veterinary science graduates who are largely public servants should be provided with some opportunity of meeting on common professional grounds, at least once a year, for the purpose of exchanging scientific information and discussing professional problems. This could be accomplished by activating the National Council of Veterinary Science and by organising District and State Veterinary Associations with representation on the Council.

62. The library facilities in many of the Veterinary Colleges are far from adequate and satisfactory and should be improved. This is equally true of many of the Agricultural Colleges. No College should undertake post-graduate training or significant research without copies of all important and pertinent scientific and professional journals, issued in the last 10 years, the several bibiographical aids, a well kept catalogue, the standard abstracting journals, and a trained librarian interested in helping students and staff to secure needed microfilms or photostats of articles not available in the library.

Organisation and Special Problems of Home Science Colleges

63. With the goal of rural improvement (which must include rural home improvement) India has embarked upon, it will be advisable to develop many more Home Science Colleges and locate them alongside agricultural colleges for the training of women who have a village background, to take their places in several vocations particularly as village level worker. One of the functions of the Indian Council of Agricultural Education should be to further the development of institutions of this type. This work is so important that it might well be the subject of special consideration, quite possibly of Central subsidy.

Organisation and Function of the Indian Council of Agricultural Education

64. The Indian Council of Agricultural Education should play an increasingly important part in the development of higher education in agriculture and veterinary science and in related fields, both at under-graduate and post-graduate levels. It should endeavour to bring about greater standards of uniformity of agricultural and veterinary curricula among the colleges primarily by proposing minimum standards. Reasonable opportunity should be given for adaptation of these curricula to State and local situations.

65. The Indian Council of Agricultural Education should constitute a forum, in part through the establishment of a Journal of Agricultural Education, for the discussion of problems of higher education that relate directly or indirectly to agriculture.

66. Appropriate measures should be taken to provide representation for the recently established National Veterinary Council on the Indian Council of Agricultural Education as both the bodies should have a voice in matters relating to veterinary education.

67. It is recommended that in view of the ever increasing importance of home science education, the Principals of all University affiliated colleges of home science be included in the membership of the Indian Council of Agricultural Education.

68. The Team recognises the importance of the recommendation of the University Education Commission that the system of University examinations requires rethinking and re-orientation. Such study for agriculturally related higher education should be undertaken by the Indian Council of Agricultural Education, and suitable recommendations developed.

69. The Team endorses the view of the University Education Commission that a determination of a student's final standing should be based not only upon the final examination but likewise upon the quality and character of his work in the college. The Team accordingly urges that the teacher should evaluate the quality of the work of the student at least upon the completion of each course and that for the purpose of the final assessment certain credit may be given to the work done by the student during the college year.

70. While the Team notes the suggestion of the University Education Commission to dispense with a University degree for appointment to Government Administrative Services, it would not wish to subscribe to this policy if applied for recruitment to technical services and posts.

71. In the teaching institutions greatest care should be taken to ensure that the syllabus does not tend to become static, but keeps pace with the advance of science and the progress of pertinent research. The successful teacher is one who sees beyond the mere outlines of the syllabus and covers current findings of research which may be even more significant to the student and his immediate future than the subjects formally included in the syllabus.

72. There is some divergence in the requirements of degrees from agricultural and veterinary colleges due to differences in the curricula as approved by several autonomous Universities. There is need for greater standardisation of curricula and of procedures for the raising of educational standards of these colleges without 'over-standardisation' and it is recommended that this be done through the Indian Council of Agricultural Education.

73. The Team believes that India has facilities and staff that are under-utilised in service to agricultural research and post-graduate education and recommends that the facilities of the Central Agricultural Institutes as well as those administered by agencies other than the Ministry of Food and Agriculture should be carefully considered by the Indian Council of Agricultural Education and co-ordinated in an overall scheme for post-graduate instruction.

74. The Team feels that the time is opportune for developing on a regional basis, with Central assistance, at least five Agricultural Colleges and Institutes and five Veterinary

Colleges and Institutes into strong centres of post-graduate teaching. Subject to certain conditions, it is recommended that the following institutions may be approved for such treatment:

Agriculture: (1) I.A.R.I., New Delhi, (2) Ludhiana College, Punjab, (3) Agricultural College at Haringhatta, West Bengal, (4) Anand Agricultural Institute (or Poona Agricultural College), Bombay State, and (5) Coimbatore Agricultural College, Madras State.

Veterinary: (1) I.V.R.I., Izatnagar, (2) Veterinary College, Madras, (3) Veterinary College, West Bengal or Bihar, (4) Veterinary College, Bombay or Hyderabad, and (5) Veterinary College, Jubbalpore.

75. The Team would like to place on record that the recommendation for regional post-graduate institutions should not be regarded as prejudicial to the development of other colleges as post-graduate centres.

76. It is recommended that the Indian Council of Agricultural Education consider immediately the problem of recognition of agricultural and veterinary college teachers as University professors competent to conduct post-graduate training with a view to possible raising of the standards, but with a more realistic approach to personal qualifications and degree requirements.

Organisation and Problems of Rural Universities, Rural Institutes and Manjri Type Vocational Schools

77. The Team endorses the recommendation of the University Education Commission that a Rural University should include "a ring of small resident, under-graduate colleges, with specialised and University facilities in the centre." For the complete development of a Rural University the Team would envisage in the beginning the location on the same campus and in close juxtaposition a College of Agriculture and a College of Veterinary science to which should be added in due course a college of Home Science, a fourth college of 'applied' liberal Arts and Science, a college of Technology using this term in the broad sense of engineering and industries, and with a group of villages to be used as a laboratory for the students. While one would hope that the students entering a Rural University would come largely from the villages, other students would not be excluded. The Rural University should have exactly the same autonomy as is accorded to other Universities, and the degrees which it may confer should have the same standing and prestige as those conferred by other Universities.

78. The Team recommends that the development of Rural Universities as discussed in its report should be definitely encouraged by substantial grants-in-aid from the Centre and thereby secure autonomy and efficiency of operation.

79. The Team has noted several places in India where the stage is appropriately set for organisation of Rural Universities of the type discussed and the Team would recommend for immediate consideration, the establishment of Rural Universities in Uttar Pradesh (Tarai), West Bengal (Harringhatta), Bihar (Patna), Orissa (Bhubneshwar), Travancore-Cochin and Bombay State (Anand).

80. The Team feels that Rural Universities, and the Vocational Agricultural Schools of the Manjri type are separate and distinct institutions with clear and well-defined functions to perform. The Team is of the opinion that the setting up of a 'Rural Institute' without realising that it is neither a Rural University nor a Vocational Agricultural School would fulfill the high ideals envisaged in the report of the Committee on Rural Education. The good features of this report can be incorporated in the existing agricultural colleges which could be helped to develop eventually into Rural Universities. Emphasis should, however, be placed on the development of more Vocational Agricultural Schools of the Manjri type.

81. The Team strongly endorses the proposal to set up Vocational Agricultural Schools of the Manjri type in each District, and regards this experiment in rural education as being decidedly worthwhile

82. It is recommended that a special search be made in such Manjri type schools for particularly promising or brilliant students who should be given opportunity to proceed with their education at a still higher level in agricultural and veterinary colleges in India.

83. The anticipated rise in economic level in the villages would need continual adjustments in the instruction in such vocational agricultural schools.

84. In brief, the Team believes that wherever possible each State should aim at developing a Rural University in the State and a Vocational Agricultural School of the Manjri type in each District.

85. The Colleges of Agriculture, Veterinary Science and Animal Husbandry, and Home Science should assume the responsibility, on a continuing basis, for the training of extension workers, after the present emergency *ad hoc* training programme is no longer required.

86. It should be the responsibility of the National Extension Service organisation to see that recommendations to farmers are based upon the best current findings of the Central and State research institutions.

87. The responsibility of the Central Ministry of Food and Agriculture should be to provide adequate liaison between the I.C.A.R., as the technical arm of the Ministry, and the National Extension Service—Community Projects Administration. The Chief of Advisory and Information Services in the I.C.A.R. should be the principal contact officer.

subject-matter extension specialists as might be employed on the staff of the Joint Director of Extension.

91. In order to provide procedures whereby research workers can be continuously informed about the problems of cultivators that require practical solution, advisory committees under the I.C.A.R. or the Ministry of Food and Agriculture should be continued, with new advisory committees established as required to provide for such attention at the Central level.

92. To ensure adequate liaison between research staff and extension workers at the State level relative to practical research needs, meetings should be developed annually, or six monthly if necessary, at which time the senior research staff, agricultural advisory staff, and the subject-matter extension specialists can discuss the problems requiring research attention, the extent to which the existing knowledge can meet such needs and the desirability of initiating further research.

93. As a second important procedure in the States to ensure effective contact between research workers and the people on the land, field-day programmes should be held at the Central Institute stations, State colleges or experiment stations, sub-stations and demonstration plots at appropriate times during the season.

94. The Chief of Advisory and Information Services in the I.C.A.R. should furnish the necessary liaison at the Central level for those organisations interested in information for guidance of programmes of storage, marketing, or related agricultural fields. The technical officer specialists associated with colleges and research stations at the State level should provide ample contact in the States for transmitting such information.

95. The development of suitable publications for the transmission of practical information to cultivators and village level workers should be the responsibility of the I.C.A.R. at the Centre and of the State Departments of Agriculture and the colleges of agriculture in the States.

96. The subject-matter and format of publications for transmission of practical information to cultivators should be determined co-operatively by the Chief of Advisory and Information Services of I.C.A.R. and the N.E.S. staff. Cost of purchase of copies of such publications for the village level workers should be borne by the N.E.S.

97. At the State level provision should be made for similar relationships between the appropriate officers or technical advisory specialists at the colleges and the extension staff.

Relation of Research and Education to Service and Regulatory Activities

98. The funds designated for research, education or extension should not be devoted to administrative and other over-head costs involved in the rendering of agricultural services, such as the increase and distribution of improved crop seeds, the distribution of fertilisers, artificial insemination services or similar activities of a service nature.

99. The time of scientific staff should not be devoted, to the detriment of their normal

work, to supervisory services of the nature mentioned above or similar service activities that are not of a scientific or technical nature.

100. Various types of action or development programmes, such as quarantine or other restrictions, the administration of subsidy payments, land clearing, and related activities should not be confused with extension or research. Special steps should be taken to provide for staff to handle such activities to minimise interference with the normal duties of the research, education, and extension staff.

101. Extension workers should not be expected to apply or enforce control or regulatory measures since such activities affect the desirable working relations that should be maintained between cultivators and extension officers.

Administration and Personnel Management

102. The enthusiasm for developing improved physical facilities in agricultural research and educational institutions has not been accompanied by adequate foresight in providing for the type of scientific and teaching staff that is essential if the new facilities are to function effectively. This should be remedied as the quantity and quality of research or teaching that can be expected from improved facilities will be almost directly dependent upon the quantity and quality of the staff available.

103. The direction or supervision of research or educational programmes in agriculture, as in any other field, must be entrusted to individuals who have a full understanding of the problems, requirements and potentialities in these technical fields. The increasing tendency in India in some States or institutions to place non-technical administrative officers in charge of agricultural research, education and other technical services is a move towards mediocrity in technology. This particularly applies to key positions of State Directors of Agriculture. Since these posts have immediate responsibilities for research and education in agriculture at the State level, there should be proper technical leadership at the head to lend stability and serve as a stimulating and driving force.

104. It is observed that in a country whose economy is predominantly based upon agriculture, individuals trained in agriculture are not eligible to compete for the Indian Administrative Service posts. It does not appear sound to perpetuate a system which excludes trained agriculturists from posts of responsibility in administering the many Governmental activities that must necessarily involve agriculture in a country such as India. Steps must be taken to remedy this defect.

105. One of the most important obstacles in the development of a high grade technical agricultural service in India is the current system of promotion based principally on seniority. Several young scientists trained abroad, who are enthusiastic about the prospect of making real contributions to Indian agricultural research, are soon disillusioned as they have almost equal opportunity to advance if they assume a desk position of scientific direction and permit the subordinate staff available to them to lay out the experiments and bring back the data for their observation. Provision must be made for the periodic evaluation of the competence and productivity of research workers as a primary basis for promotion.

106. Another major problem in the advancement of scientists is the transfer of specialists trained in a certain discipline to higher positions in another scientific field for which they are not especially qualified, but to which they are considered entitled on the basis of seniority. In order to diminish the tendency for shifting of scientists from one field to another for which they are not basically qualified, categories should be established within which scientists can advance so that they can maintain continuity and long experience in their own scientific field.

107. A further deficiency in the promotion scheme is the provision in many instances that a certain proportion of the vacancies should be filled by promotion and a certain promotion by open recruitment. The failure to promote a well-qualified and deserving individual already on the staff and to place over him a less qualified individual brought in from outside, merely to satisfy a formula, is demoralising and detrimental to any research organisation. While it is recognised that opportunity should be provided for entry of new individuals into the scientific fields, this entry should be on the basis of qualification and merit.

108. There is little provision at the present time for the heads of institutions or organisations to assume any reasonable degree of responsibility in the selection of personnel for the key scientific, teaching or other technical posts under them. It is recommended that a major responsibility for such selection should be placed on the head of the organisation or agency in which the individual is to be employed.

109. The efficient management of any organisation requires a reasonable assignment of recognised authority to the various administrative or organisational levels. Such delegation of responsibility is lacking in a number of research and educational institutions. India will not lack in technical and professional leadership in agriculture if individuals employed in these institutions are given a reasonable opportunity to develop experience, confidence and competence through the assignment of increasing responsibilities.

110. The time and energy of technical or professional personnel in agriculture can be utilised more effectively if they are not burdened with routine administrative matters. It is recommended that provision should be made whereby many of the non-technical items of work in the institutions are handled by administrative people.

111. The failure to delegate adequate responsibility to heads of the various organisations or units for purchase of supplies and equipment results in inefficiency through delay in procurement of items essential for the conduct of research or teaching activities. The financial powers of heads of research institutions should be reviewed to see that there is a reasonable delegation of authority in the matter of purchase of supplies or equipment up to ceilings laid down.

112. The disparity between the salaries of scientists or teachers in agriculture and administrative positions is unrealistic and results in a down-grading of scientific stature in India and a loss of a disproportionate share of India's intellectual competence which is decanted off into the administrative field. An early review of the salary scales of the scientific staff in agriculture by the next Pay Commission is essential to ensure salary adjustments that will attract and hold scientific personnel if agriculture in India is to progress.

113. In many of the research and educational institutions there is need for development of a staffing pattern that will provide for more high level positions in the respective sections or units. Research units cannot produce substantial results if they are staffed by one high level scientist, with a number of lower level supporting helpers. India cannot afford to risk its future technological advancements because of an unwillingness to employ and support scientists of the calibre required effectively to solve complex agricultural problems.

114. In view of the critical shortage of technical specialists in agriculture every effort should be made to retain those individuals who are well-qualified, in good health and willing to continue in active service, beyond the current retirement age of 55. Procedures should be developed whereby decisions could be reached regarding the continued employment of an individual substantially in advance of the date of his proposed retirement and also to ensure that extensions are not given piece-meal.

Professional Societies and Farm Organisations

115. Attention should be given to the strengthening or activation of professional societies relating to agriculture, to provide an opportunity for scientists to meet at least once annually to exchange information and ideas of a professional nature.

116. The meetings of professional societies should be held in different parts of India in different years so that a large number of scientists will have an opportunity to attend such meetings at least once in two or three years with a minimum of travel costs.

117. In view of the fact that there are a large number of scientists as Central or State employees, the Central and the State Governments should adopt a more liberal policy in providing funds for travel to permit attendance of scientists at national and also international scientific meetings.

118. Organisations of farmers should be encouraged and assisted, wherever possible, to ensure the development of the type of organisations that truly represent and speak for rural people, as a means of ensuring constructive guidance and influence of rural people in shaping educational, scientific and other programmes or policies relating to agriculture.

APPENDIX I

Government of India Resolution No. F. 5(4) 54—Edn.
Ministry of Food and Agriculture

(I.C.A.R.)

New Delhi, 24th November, '54

RESOLUTION

Subject:—Strengthening of Agricultural Research and Education Institutions in India.

The Government of India have been considering for some time past measures necessary to make the institutions in India dealing with agricultural research and agricultural education at college level play their role in a more adequate manner in the general plans for agricultural development of the country. These institutions require in varying degrees assistance both in regard to equipment and to staff. Their work requires to be co-ordinated *inter se*, so that each can perform best that which it is designed best to perform. The Government of India have in the past given some assistance, though in an *ad hoc* manner, to these Institutions, and a measure of co-ordination too is being achieved through the Indian Council of Agricultural Research. The Government of India have now come to the conclusion that such *ad hoc* assistance should be replaced by a well conceived continuing scheme.

2. The experience of the Agricultural Colleges and Research Institutions in the U.S.A., particularly the Land Grant Colleges, who have a long history of agricultural development work, it is felt, would provide some useful guide lines for strengthening Agricultural Colleges in India and for promoting Centre-State co-operation and co-ordination in the field of agricultural research. It has accordingly been decided that a joint Team of Indian and American Specialists, dealing with agricultural research and education, should make a comparative study of the organisation, functions and the working of Indian and American Agricultural Research Institutions and Agricultural Colleges, and make recommendations, including in particular as to how the assistance envisaged under various T.C.M. Agreements, could be utilised to maximum advantage, to remove some of the critical deficiencies in the existing facilities for agricultural research and education in India.

3. The composition and terms of reference of the Team are as under:—

(1) Shri K.R. Damle, I.C.S.,
Vice-President, I.C.A.R., and ex-officio Additional Secretary, Ministry of Food and Agriculture (*Chairman*)

Members:

(2) Dr B.N. Uppal,
Agricultural Commissioner with the Government of India,

(3) Dr Laxmi Sahai,
Director, Indian Veterinary Research Institute,
(4) Dr H.K. Nandi,
Director of Agriculture, Government of West Bengal,
(5) & (6) Two representatives of high standing and responsibility from American State Institutions, and
(7) One representative from the U.S. Department of Agriculture.

Secretary:

(8) Shri J.V.A. Nehemiah, M.A.,
Secretary, Indian Council of Agricultural Research, and ex-officio Deputy Secretary, Ministry of Food and Agriculture.

The Team would have the following broad terms of reference:

(*i*) To study the functions, organisation and working of American and Indian Institutions engaged in agricultural research, extension and agricultural education at college level, and to suggest methods for co-ordinating the work of such institutions in India functioning under the Centre, the States and the Universities;

(*ii*) To suggest measures whereby agricultural educational institutions in India can develop programmes of work so as to provide avenues of training for men who actually till the soil and those who select agricultural research, education, extension or agricultural industry, as their career;

(*iii*) To study the needs of agricultural Institutions in India and make recommendations for strengthening and improving them by providing laboratory and farm equipment and by the training of personnel engaged in teaching and research so as to make them function more efficiently.

Note: The term 'Agriculture' is used in the broad sense and includes Animal Husbandry, Veterinary Science and other allied subjects.

4. The Team is expected to commence its studies early in 1955 and complete its studies by September, 1955, and would submit its report immediately thereafter.

(H.M. Patel)
Secretary to the Government of India

To
The Publisher,
Gazette of India, New Delhi

Order

ORDERED that the Resolution be published in the Gazette of India:

ORDERED also that a copy (with usual spare copies) be forwarded to all the Ministries of the Government of India, all the State Governments (Parts A to D), all Attached and Subordinate offices under the Ministry of Food and Agriculture, all members (both

Governing and Advisory Boards) of the I.C.A.R., Planning Commission, Community Projects Administration, Cabinet Secretariat, Prime Minister's Secretariat, the President's Secretariat, and all members of the Education Team.

By Order,
(J.V.A. Nehemiah)
Deputy Secretary to the Government of India

APPENDIX II

Biographical sketches of the individual members of the Team

Name: Kashinath Raghunath *DAMLE*

Position: Vice-President (Administrative Head) of Indian Council of Agricultural Research and Additional Secretary to the Government of India, Ministry of Food and Agriculture. (Appointed Chairman, Tariff Commission, India, from 15th September, 1955).

Education: University of Allahabad 1924-26, Bachelor of Science;
University of London 1926-29 Bachelor of Science (Honors);
King's College, London, Member of the Indian Civil Service.

Travel in other countries: United Kingdom 1926-29 and 1939; 1955.
Australia 1944-48; China 1951; Japan 1952; U.S.A. 1952 and 1955; France, Sweden, Denmark, Holland, Germany, Switzerland; 1955.

Home Address: Tariff Commission, Bombay, India.

Name: Badri Nath *UPPAL*

Position: Agricultural Commissioner with the Government of India, Indian Council of Agricultural Research, Ministry of Food and Agriculture, New Delhi.

Education: Iowa State College of Agriculture 1921-25, Ph.D. in Agricultural Botany, with specialisation in Bacteriology; Rothamsted Experimental Station (U.K.), University of Wisconsin, and Rockefeller Institute for Medical Research (U.S.A.) in plant viruses, 1933-34.

Travel in other countries: U.S.A. 1921-25, 1933-34, 1955; United Kingdom and Sudan 1933-34; United Kingdom, France, Sweden, Denmark, Holland, Germany and Switzerland, 1955.

Home address: 20 Pandara Road, New Delhi.

Name: Laxmi *SAHAI*

Position: Director, Indian Veterinary Research Institute, Ministry of Food and Agriculture.

Education: Agra College, 1920-24, Bachelor of Science; Allahabad University, 1924-26, Master of Science (Zoology); Royal (Dick) Veterinary College—Edinburgh, 1927-30, M.R.C.V.S.; Institute of Animal Pathology—Cambridge, Royal Veterinary College—London, 1938-41 (Bacteriology).

Travel in other countries: United Kingdom 1927-30, 1938-41, 1955; U.S.A. 1955; (See Education) France, Sweden, Denmark, Holland, Germany and Switzerland, 1955.

Address in India: Director, Indian Veterinary Research Institute, Izatnagar, District Bareilly.

Name: Hirendra Kumar *NANDI*
Position: Director of Agriculture under Government of West Bengal Administration and Director of Agricultural Research, Extension and Education for State of West Bengal.
Education: Presidency College—Calcutta, 1927-29, Bachelor of Science (Honors in Botany); College of Science and Technology—University of Calcutta 1929-31, Master of Science (Botany); King's College—London 1931-33, Ph.D. (Research Course in Cytogenetics).
Travel in other countries: United Kingdom 1931-36 (See Education) and 1955; U.S.A. 1955; France, Sweden, Denmark, Holland, Germany and Switzerland, 1955.
Home address: 50 A Theatre Road, Calcutta-16, India.

Name: Jos Victor Alexander *NEHEMIAH*
Position: Secretary of Indian Council of Agricultural Research, and Deputy Secretary in Ministry of Food and Agriculture, Government of India.
Education: University of Madras 1932-34, Bachelor of Arts and 1935-37, Master of Arts (Physics).
Travel in other countries: Singapore 1949; Italy 1951 and 1953; U.S.A 1955; United Kingdom, France, Sweden, Denmark, Holland, Germany and Switzerland, 1955.
Home address: 67 Lodi Road, New Delhi-3, India.

Name: Albert H. *MOSEMAN*
Position: Director of Crops Research, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.
Education: University of Nebraska, B.Sc. 1938, M.Sc. (Agronomy). University of Minnesota Ph.D. 1944 (Plant Breeding and Genetics).
Travel in other countries: Portugal, Italy, Egypt, Lebanon, Syria, Iraq, Iran, Pakistan, India, Ceylon, Thailand, and the Philippines, 1950; Mexico 1955; France, England, 1955.
Home address: 4011 College Heights Drive, Hyattsville, Maryland (U.S.A.).

Name: Elden E. *LEASURE*
Position: Dean, School of Veterinary Medicine, Kansas State College of Agriculture and Applied Sciences, Manhattan, Kansas, U.S.A.
Education: Kansas State College, D.V.M. 1923, M.Sc. 1930.
Travel in other countries: Canada, Mexico, Cuba, England, France.
Home address: 318 South 17th St. Manhattan, Kansas.

Name: Robert E. *BUCHANAN*
Position: Professor of Bacteriology (Emeritus), Dean of the Graduate College (Emeritus), Director of Iowa Agricultural Experiment Station (Emeritus), Iowa State College, Ames, Iowa (U.S.A.).

Education: B.Sc. (Iowa State College), M.Sc. (Iowa State College), Ph. D. (University of Chicago), D.Sc. (*honoris causa* Rutgers University).

Travel in other countries:

1930. England , London.
Visited Universities and experiment stations in Holland, Germany, Czechoslovakia, Austria, Switzerland and England.

1936. Visited Universities and Research Stations in Denmark, Germany, Czechoslovakia, Hungary, Austria, Switzerland, Holland, England and Scotland;

1946. Member, Special Mission from U.S. Department of Agriculture and U.S. Department of State to Lebanon, Syria, Egypt, Saudi Arabia, and Iraq;

1947. Denmark;

1949. Member of Agricultural Advisory Committee to Special Mission of the United Nations on Dispossessed Arabs, Lebanon, Palestine, Syria;

1949-50: Guest Professor Goethe University, Frankfurt-on-Main, Germany;

1950. Trinidad, Brazil;

1953. Holland, Lebanon, Syria, Greece, Yugoslavia, Austria, Germany, Belgium, France, Italy, Ireland;

1955. Mexico, Brazil, Peru, Panama, Costa Rica, Guatemala.

Home address: 503 Welch Ave., Ames, Iowa, U.S.A.

Office: Room 316 Curtiss Hall, Iowa State College, Ames, Iowa, U.S.A.

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APPENDIX III

The places visited and the officials met in the U.S.A. by the Team

Places visited	Officials met
Washington D.C.:	
Foreign Operations Administration—Office of Food and Agriculture	Mr. George C. Phillips Mr. Dana Raynolds, Technical Adviser Mr. Wessels Middaugh, Technical Adviser
United States Department of Agriculture	Dr Earl L. Butz, Assistant Secretary of Agriculture Dr Ralph S. Roberts, Administrative Assistant Secretary Dr B.T. Shaw, Administrator, Agricultural Research Service Dr Ellis Clough, Program Specialist, Foreign Agriculture Service Dr Wilhelm Anderson, Chief, Asia and Middle East Analysis Branch, Foreign Agricultural Service Mr. Glenn Briggs, Assistant to the Administrator Mr. P.K. Hooker, Training Specialist, Federal Extension Service Dr Harry Diener, Training Specialist, Soil Conservation Service Dr A.J. Nichols, Assistant Director, Foreign Training Division, Foreign Agricultural Service Dr Sherman Johnson, Director, Farm and Land Management Research, Agricultural Research Service
United States Department of Agriculture Graduate School	Mr. T. Roy Reid, Director Miss Louise Bercaw, Assistant Director Mrs. Helen Stoessel, Foreign Training Division, Foreign Agricultural Service Mr. Strother B. Herrell, Assistant Director, Office of Personnel Dr D.A. Williams, Administrator of Soil Conservation Service Dr G.E. Young, Deputy Administrator of Soil Conservation Service Dr George Irving, Jr., Assistant Administrator Dr S.B. Fracker, Assistant to the Administrator Mr. Glen Briggs, Research Co-ordinator Dr F.C. Elting, Deputy Assistant Administrator of Experiment Stations

	Dr H. C. Knoblauch, Director, State Experiment Stations Division
	Dr Neil W. Johnson, Head, Central Project Office
	Mr. Frank Spencer, Assistant Administrator for Management
	Mr. Edmund Stephens, Director of Budget and Finance
	Mr. R.L. Struttman, Finance Branch
	Mr. J.H. Starkey, Director, Personnel
Plant Industry Station, Agricultural Research Centre	Mr. C.A. Logan, Superintendent
	Dr F.P. Cullinan, Chief, Horticultural Crops Research Branch
	Dr A.H. Moseman, Director, Crops Research Leader
	Dr Karl Quisenberry, Assistant Director, Crops Research
	Dr O.E. Reed, Director, Livestock Research
Research Work in Greemhouses	Dr John H. Martin, Leader
	Dr H.A. Rodenhiser, Head, Cereal Crops Branch
	Dr S.C. Salmon, Project Leader
Agricultural Research Centre	Mr. Roy C. Jones, Tour Leader
	Dr Ralph Hodgson, Chief Dairy Husbandry Research
	Dr T.C. Byerly, Chief, Animal and Poultry Husbandry Research
	Dr B.T. Simms, Chief, Animal Disease and Parasite Research
	Mrs. Zelta Rodenwold, Representative, Human Nutrition and Home Economics Research
	Mr. Barnard D. Joy, Assistant to Administrator, Research Advisory Committee
	Mr. C.M. Ferguson, Administrator, Federal Extension Service
	Mr. E.H. Leker, Chief, Foreign Student Branch, Division of Extension Research and Training
	Mr. Karl Knaus, Field Agent, North Central Region, Division of Agricultural Program
	Mr. T. Weed Harvey, Assistant to the Administrator
	Mr. Ralph E. Groening, Chief, Co-operative Funds Branch, Division of Management Operations
	Mr. Frances Scudder, Director, Division of Home Economic Programs

	Mr. Henry Seften, Extension Educationist, Foreign Student Branch, Division of Extension Research and Training Mr. Clinton G. Gaylord, Regional Leader (South Pacific and Asia) National 4-H Club Foundation
Association of Land Grant Colleges and Universities, 1785 Massachusetts Avenue, N.W.	Mr. Russell I. Thackerey, Executive Secretary
Raleigh, North Carolina :	
North Carolina State College	Dr I.O. Schaub, Group Leader for North Carolina Mr. F.S. Sloan, Program Planning Division, Agricultural Extension Service Mr. F.S. Sloan, In-charge, Raleigh Rotary Club of Rotary International Dr D.W. Colvard, Dean of the School of Agriculture, North Carolina State College Dr C.H. Bastian, Chancellor Dr R.L. Lovvorn, Director of Resident Instruction, School of Agriculture Dr W.E. Caldwell, Assistant Director of Research, In-charge of Tobacco Research Investigations Dr E.T. York, Jr. Head of Agronomy Department Mr. S.H. Dobson, Extension Forage Crop Specialist Mr. H.B. James, Head, Department of Agriculture Economics Mr. C.B. Ratchford, Assistant Director, Agricultural Extension Mr. J.A. Rigney, Head, Department of Experimental Statistics Mr. D.B. Anderson, Head Division of Biological Sciences and Associate Dean, Graduate School Mr. J.W. Pou, Head, Department of Animal Industry
North Carolina State Department of Agriculture, Northampton County, Raleigh	Mr. L.Y. Ballentine, Commissioner Mr. F.H. Jeter, Director of Information Mr. P.H. Jameson, County Agent Mr. D.S. Weaver, Director of the Agricultural Extension Service Mr. J.B. Kirkland, Dean, School of Education Mr. L.L. Ray, Assistant to the Chancellor and Director of Foundations
Tennessee :	
University of Tennessee Knoxville	Mr. J.H. McLeod, Dean, College of Agriculture Dr. Curtis, T.V.A. (Tennessee Valley Authority)

College Station, Texas	Mr. D.A. Adam, Extension Staff Assistant
Texas Agricultural and Technical College System	Mr. W.W. McIlroy, Chairman, Senate Chamber, Memorial Student Center Mr. D.W. Williams, Vice-Chancellor for Agriculture, Texas A. and M. College System Dr T.D. Brooks, Dean Emeritus, Graduate School Mr. C.N. Shepardson, Dean, School for Agriculture, In-charge Dr I.M. Atkins, Project Leader, Chairman, Wheat Research in Texas Dr W.W. Armistead, Dean, School of Veterinary Medicine, Incharge, Texas
Blackland Experiment Station, Temple, Texas	R.N. Smith, Superintendent, In-charge Mr. H.N. Smith, State Conservationist and staff In-charge
Texas Agricultural Experiment Station, McGregor, Texas	Mr. H.O. Hill, Superintendent, In-charge
Hillsboro, Texas	Mr. Charlie Clark, Company Agent, In-charge, Hill County Court House Office
Itasco, Texas	Mr. John Acton, Adviser, In-charge, Itasco Future Farmers of America Chapter

California:

United States Department of Agriculture—Southwestern Irrigation Field Stations, Brawley, California	Mr. Edward G. Noble, Superintendent
United States Soil Salinity Laboratory, Riverside California	Mr. H.E. Hayward, Director
California State Citrus Experiment Station, Riverside, California	Mr. Myron, M. Winslow, Senior Administrative Assistant, Director's Office
University of California, College of Agriculture, Davis, California	Mr. W.M. Herms, Public Service Office

Wisconsin:

University of Wisconsin, Madison, Wisconsin	Mr. R.K. Froker, Dean, College of Agriculture

Illinois:

United States Regional Research Laboratory, Peoria, Illinois	Mr. W.D. Maclay, Chief, Northern Utilization Research Branch

Washington D.C.:

Foreign Operations Administration	Mr. George C. Phillips, Office of Food and Agriculture

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APPENDIX IV

The places visited and the officials met in India by the Team

Places visited	Officials met
Delhi:	
Ministry of Food and Agriculture, Jaisalmer House, New Delhi	Shri Ajit Prasad Jain, Minister for Food and Agriculture Dr P.S. Deshmukh, Minister for Agriculture Shri P.N. Thapar, I.C.S., Secretary to the Government of India, Ministry of Food and Agriculture
Indian Council of Agricultural Research, Queen Victoria Road, New Delhi	Shri K. R. Damle, I.C.S., Vice-President, I.C.A.R. and Additional Secretary to the Government of India Dr B.N. Uppal, Agricultural Commissioner with the Government of India Shri J.V.A. Nehemiah, Deputy Secretary to the Government of India and Secretary, I.C.A.R. Dr Laxmi Sahai, Director, I.V.R.I. Dr K.C. Sen, Director, Indian Dairy Research Institute Shri S.C. Roy, Agricultural Extension Commissioner Dr G.R. Seth, Professor of Statistics, I.C.A.R. Dr K.B. Lal, Plant Protection Adviser and Director Locust Control Dr B.C. Sen, Deputy Agricultural Marketing Adviser to the Government of India Shri R.N. Mohan, Assistant Animal Husbandry Commissioner, I.C.A.R.
Indian Agricultural Research Institute, New Delhi	Dr B.P. Pal, Director, I.A.R.I. Dr T.J. Mirchandani, Head of the Division of Agronomy Shri R.V. Ramiah, Head of the Division of Agricultural Engineering Dr S.P. Raichaudhury, Head of the Division of Chemistry Dr R.S. Vasudeva, Head of the Division of Mycology Dr S.M. Sikka, Head of the Division of Botany
Planning Commission, Rashtrapati Bhavan, New Delhi	Shri V.T. Krishnamachari, Deputy Chairman, Planning Commission Shri V.S. Hejmadi, I.C.S., Secretary to the Planning Commission

	Shri E.P. Moon, I.C.S., Adviser (Planning) Shri Tarlok Singh, I.C.S., Joint Secretary, Planning Commission
Community Projects Administration, Rashtrapati Bhavan, New Delhi	Shri U.L. Goswami, I.C.S., Secretary, Community Projects Administration Shri Jaganathan, Deputy Secretary, Community Projects Administration Shri Krishna Chand, Deputy Secretary, Community Projects Administration Shri A.D. Bohra, Director (Training)
Union Ministry of Education, Central Secretariat Buildings, North Block, New Delhi	Shri Humayun Kabir, Secretary to the Government of India, Ministry of Education Shri K.G. Saidyidani, Additional Secretary, Ministry of Education Shri Astfaque Hussain, Joint Secretary
University of Delhi	Dr G.S. Mahajani, Vice-Chancellor
National Physical Laboratory, New Delhi	Dr K.S. Krishnan, Director, National Physical Laboratory Dr K.N. Mathur, Deputy Director, National Physical Laboratory
Punjab :	
Secretariat, Chandigarh	Shri Pratap Singh Kairon, Development Minister, Punjab Shri M.S. Randhawa, I.C.S., Secretary, Development Department and Development Commissioner, Punjab Shri H.B. Lal, Deputy Secretary, Development Department Shri Pritam Singh Dial, Assistant Director of Agriculture, Punjab Shri B.N. Handa, Director, Animal Husbandry and Warden of Fisheries, Punjab
College of Veterinary Science and Animal Husbandry, Hissar	Shri R.R. Ghulati, Principal, Veterinary College
Livestock Farm, Hissar	Shri Jagnandan Singh, Superintendent, Livestock Farm
Agricultural College, Ludhiana	Dr M.R. Madhok, Principal, Agricultural College
Bombay :	
College of Agriculture, Poona	Shri L.S.S. Kumar, Principal
National Chemical Laboratory of India, Poona (Bombay)	Dr. G.I. Singh, Director, N.C.L.
Poona University, Poona	Dr. M.R. Jayakar, Vice-Chancellor
Secretariat Building, Bombay	Shri B.S. Hiray, Minister for Agriculture Shri V.L. Sardesai, I.C.S., Secretary Agriculture and Forest Department

	Shri S.R. Chadha, Director, Veterinary Services Dr T.G. Shirname, Director of Agriculture, Shri S. W. Mensinkai, Principal, College of Agriculture, Dharwar Dr M.D. Patel, Director, Institute of Agriculture, Anand
Veterinary College, Bombay	Shri F.S. Khambata, Principal
Hyderabad:	
Secretariat Building, Hyderabad	Dr. M. Chenna Reddy, Minister for Agriculture Shri Jagjiwan Chand, Secretary, Agriculture Department Shri Eqbal Chand, I.A.S., Director of Agriculture
Osmania University	Dr G. Bhagwantam, Vice-Chancellor Dr Amir Ali, Principal, Agriculture College Dr Habib Khan, Principal, Veterinary College
Indian Central Oilseeds Committee	Dr P. J. Gregory, Secretary, Indian Central Oilseeds Committee Shri Laxminivas Ramlal Ganeriwal, Member Shri Clarence Gideon, Member
Madras:	
Secretariat Buildings, Madras	Shri M. Bhaktavatsalam, Minister for Agriculture Shri N.S. Arunachalam, I.C.S., Secretary, Food and Agriculture Department Shri M. Sivaraman, I.C.S., Director of Agriculture Shri V.R. Rajagopalan, Director, Veterinary Services
Veterinary College, Madras	Shri Bartie A.D'Souze, Principal
Madras University	Registrar, Madras University
Agricultural College and Research Institute, Coimbatore	Shri R. Balasubramaniam, Principal
Cotton Breeding Station, Paddy Breeding Station, Millet and Pulses Breeding Station, Coimbatore	
Central Sugarcane Breeding Institute, Coimbatore	Dr S. Dutta, Director
Travancore-Cochin:	
Secretariat Buildings, Trivandrum	Shri A.S. Rahim, Minister for Food and Agriculture Shri George Thomas, I.A.S., Secretary, Food Department Shri C. Thomas, I.A.S., Director of Agriculture
Agricultural College and Research Institute	Shri K.S. Nair, Principal

Mysore:	
Indian Institute of Science, Bangalore	Prof. K. Sreenivasan, Acting Director
Secretariat Buildings, Bangalore	Dr Nagan Gowda, Minister for Agriculture
	Secretary, Agriculture Department
	Shri M. Mallaraj Urs, Director of Agriculture
	Director of Veterinary Services
	Dr B. Dasappa, Principal, Agricultural College
Indian Dairy Research Institute, Bangalore	Dr K.K. Iya
	Mr. K. Rangaswamy
Madhya Pradesh:	
Secretariat Buildings, Nagpur	Shri S.L. Tewari, Minister for Agriculture
	Shri R.C. Murab, Secretary, Agriculture Department
	Shri R.N. Pendharkar, Director of Agriculture
College of Agriculture, Nagpur	Shri R.S. Asthana, Principal
Uttar Pradesh:	
Secretariat Buildings, Lucknow	Shri Hukam Singh Visen, Minister for Agriculture
	Shri Stevenson, Secretary, Agriculture and Animal Husbandry Department
	Shri H.B. Shahi, Additional Secretary, Animal Husbandry Department
	Dr S.B. Singh, Director of Agriculture
Agricultural College, Kanpur	Shri I.G. Shrikhande, Principal
Veterinary College, Mathura	Shri P.G. Pande, Principal
State Farm, Tarai	Major Sendhu
Indian Veterinary Research Institute, Izatnagar	Dr Laxmi Sahai, Director, Indian Veterinary Research Institute
	Shri A.N. Sinha, Minister for Agriculture
Bihar :	
Secretariat Buildings, Patna	Shri R. Prasad, Secretary, Agriculture Department
	Dr. J.S. Patel, Director of Agriculture
	Shri M.I. Malik, Director of Veterinary Services
	Shri S. Anwar Ullaha, Director of Agriculture Education
Veterinary College, Patna	Shri H.R. Kapur, Principal
Central Potato Research Institute, Patna	Dr A. Ramanujam, Director
Orissa:	
Secretariat Buildings, Bhubneshwar	Shri Nabakrushna Chaudhari, Minister for Agriculture
	Shri B.S. Mahanti, Secretary, Development Department
	Shri V.S. Tilak, Director of Agriculture and Food Production
	Shri Gurbachan Singh, Director of Veterinary Services
Central Rice Research Institute, Cuttack	Dr. N. Parthasarathy, Director